MEMORANDUM

TO: Scott Glenn, Director
Office of Environmental Quality Control

FROM: Suzanne D. Case, Chairperson
Department of Land and Natural Resources

SUBJECT: Request for publication of Draft Kaua‘i Seabird Habitat Conservation Plan in the August 23, 2019 Environmental Notice

We respectfully request publication of the subject document in the August 23 Environmental Notice. Enclosed is a MS Word file of the OEQC publication form and a pdf file of the Habitat Conservation Plan.

If there are any questions please contact Jim Cogswell, Division of Forestry and Wildlife, Wildlife Manager at james.m.cogswell@hawaii.gov or 808-587-4187.
Project Name: Kaua'i Seabird
Applicable Law: HRS Chapter 195D
Type of Document: Draft Habitat Conservation Plan
Island: Kaua'i
District: All
TMK: All
Permits Required: Incidental Take License
Applicant or Proposing Agency:
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  Daniel Farkas
Attraction to artificial lights is a known threat to seabirds that has been observed and documented on the island of Kaua'i for decades. The draft Kaua'i Seabird HCP (KSHCP) has been developed to address light attraction impacts on Kaua'i to three seabird species protected under State and Federal endangered species laws: the Hawaiian Petrel (Pterodroma sandwichensis), the Newell's Shearwater (Puffinus auricularis newellii), and the Band-rumped Storm-petrel (Oceanodroma castro). The draft KSHCP also addresses the impacts of lights on the Central North Pacific distinct population segment of the listed Green Sea Turtle (Chelonia mydas).

Light attraction on Kaua'i is an islandwide problem collectively attributable to many different entities; the structure of the KSHCP enables multiple Applicants on Kaua'i to apply for Incidental Take Licenses (ITLs) under specific terms and conditions. Covered activities in the draft KSHCP are: the placement and operation of light structures that can cause disorientation of fledgling and adult seabirds, and hatchlings of the Green Sea Turtle; the placement and operation of new or future lights that have similar effects; and conservation and mitigation measures. The mitigation proposal would create a site for seabirds to nest and breed in a predator-free protected area. Compliance and effectiveness monitoring, and adaptive management, will be conducted to monitor take and to enable the Department of Land and Natural Resources to determine that mitigation actions are meeting conservation goals for the covered species. The proposed duration of the KSHCP and associated ITLs is 30 years.

The public may send comments to the Approving Agency Contact listed above with a copy to the Applicant(s). Comments must be received by October 22, 2019.
Kaua`i Seabird
Habitat Conservation Plan

DRAFT August 2019
Executive Summary

Three listed seabird species breed seasonally in Hawai‘i: the Newell’s Shearwater (*Puffinus auricularis newelli*, Hawaiian name: ‘a‘o), the Hawaiian Petrel (*Pterodroma sandwichensis*, Hawaiian name: ‘ua‘u), and the Hawai‘i distinct population segment (DPS) of the band-rumped storm-petrel (*Oceanodroma castro*, Hawaiian name: ‘akē‘akē, hereafter band-rumped storm-petrel), making the islands essential to the conservation of these species. These species are part of the unique natural and cultural heritage of Hawai‘i, and the island of Kaua‘i provides important breeding habitat for all three species. Protecting and managing that habitat to support viable populations of these species is critical for their long-term survival.

Among the threats known to impact the listed seabird species is attraction to artificial lights, which has been observed and documented on Kaua‘i for decades. The Kaua‘i Seabird Habitat Conservation Plan (KSHCP) has been developed to address light attraction impacts to the listed seabirds on the island of Kaua‘i. The KSHCP also addresses the impacts of lights on the Central North Pacific distinct population segment (DPS) of the green sea turtle (*Chelonia mydas*, Hawaiian name: honu, hereafter honu). The proposed duration of the KSHCP is for 30 years and the geographic scope of the KSHCP coverage is the island of Kaua‘i.

Seabird attraction to artificial lights is a commonly-observed phenomenon affecting petrel and shearwater species around the world, in many cases negatively altering their behavior. Fledgling seabirds are more affected by light attraction than adult seabirds, although adult birds also demonstrate altered behavior in the presence of unshielded lights, particularly near breeding colonies. At night, as the fledglings make their first flight from nesting sites to the sea, artificial lights degrade and impact their migratory corridor habitat. In the presence of light, the seabirds circle repeatedly and can become exhausted and often grounded as a result (commonly termed “fallout”) or collide with structures in the process. Once grounded, the seabirds experience difficulty in resuming flight, and are vulnerable to introduced predators and vehicle traffic, such that unless rescued, they are assumed to have died, based on decades of seabird observations and reports. On Kaua‘i, birds that are rescued are sent to the Save Our Shearwaters program for rehabilitation and released back into the wild where possible.

Light attraction fallout on the island of Kaua‘i occurs in a widespread manner, with certain geographic areas having concentrated, higher amounts of observed fallout. Seasonally, most fallout occurs in the autumn months, coinciding with the seabird fledgling season. Many different entities on Kaua‘i (resorts, businesses, and governmental agencies) have documented seabird fallout on their property and at their facilities resulting from the effects of light attraction. Light attraction on Kaua‘i is an island-wide problem that negatively impacts the listed seabird species and is collectively attributable to many different entities.

Of the three listed seabird species, the ‘a‘o is the species most impacted by light attraction. The ‘ua‘u and the ‘akē‘akē are impacted to a much lesser degree.
The KSHCP relies on a unique structure to best meet the need for an effective and efficient response to the widespread nature of light attraction impacts on Kaua‘i. The structure of the KSHCP enables multiple individual entities on Kaua‘i to each apply for take authorization for light attraction impacts to the listed seabird species under one coordinated framework. This framework takes advantage of economies of scale and enables a pooling of resources to collectively achieve conservation goals. The requirements of the KSHCP, and the enrollment and approval process for listed species take authorization are defined in the KSHCP and consist of two parts: 1. the KSHCP document with associated appendices and 2. materials submitted by each Applicant which provide detailed descriptions of on-site minimization measures, covered activities, a monitoring plan, and the amount of take authorization being requested.

Applicants to the KSHCP are seeking an Incidental Take Permit (ITP) from the U. S. Fish & Wildlife service (USFWS) and an Incidental Take License (ITL) from the State of Hawai‘i Department of Land and Natural Resources (DLNR). The mitigation and minimization measures contained in the KSHCP have been developed to inform the preparation of individual applications for listed seabird take authorization permits.

The KSHCP defines a set of actions to minimize and mitigate the effects of light attraction on the listed seabirds and to meet conservation goals. The KSHCP provides a suite of minimization actions and requires that each Applicant to the KSHCP implement all of the measures that are applicable to their facility and operational needs. Minimization measures emphasize reducing the amount of light that shines upward and reducing the amount of light output or intensity, which have been shown to reduce the effects of light attraction. Under the KSHCP, the minimization measures include:

- Deactivation of unnecessary lights;
- Use of full cut-off light fixtures (or their functional equivalent);
- Shielding existing light fixtures;
- Angling lights downward;
- Lowering the light output or intensity;
- Use of motion sensor light fixtures; and
- Decreasing the visibility of interior lights.

Under the KSHCP, mitigation actions are designed to be commensurate with the degree of impact caused by the taking of a listed seabird. Because some seabirds grounded by light attraction are found alive and deemed healthy, or are able to be rehabilitated, those birds will be released back into the wild. For seabirds that are found dead, those not found but assumed to have been impacted by light attraction, and for those birds that could not be released back into the wild, light attraction is considered to have caused the mortality of the affected birds. For impacts to those birds, mitigation will consist of predator control and the creation of a fenced seabird preserve in the northwest region of Kaua‘i. In this preserve, predators will be removed and seabirds will be lured to the site via social attraction, a well-established conservation technique for the creation of new seabird colonies. The absence of predators will enable the seabirds to breed more successfully and with higher reproduction rates than in
areas outside the preserve, thereby providing a conservation benefit to the seabird populations. The preserve site is located in Kōkeʻe State Park along the Kalalau rim. Predator control will be conducted in the vicinity of the preserve to reduce the impacts of predation on seabirds breeding nearby.

The funding design of the KSHCP features a cost-sharing structure. Total costs of the KSHCP, including implementation, mitigation, monitoring, Adaptive Management as needed and reporting, will be shared amongst the permit recipients according to the relative amounts of take authorized.

Compliance and effectiveness monitoring will be conducted to ensure that authorized amounts of take are not exceeded and to enable the wildlife agencies to determine that mitigation actions are meeting conservation goals. In response to monitoring results, Adaptive Management will be implemented in the event that mitigation actions require changes to meet conservation goals as new information is obtained during implementation of the KSHCP.
**Acronyms for this Document and all Associated Appendices**

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<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
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<td>Board of Land and Natural Resources</td>
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<td>DAR</td>
<td>Division of Aquatic Resources</td>
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<td>DLNR</td>
<td>Department of Land and Natural Resources</td>
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<td>DOFAW</td>
<td>Division of Forestry and Wildlife</td>
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<tr>
<td>EA</td>
<td>Environmental Assessment</td>
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<tr>
<td>EIS</td>
<td>Environmental Impact Statement</td>
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<tr>
<td>ESA</td>
<td>Endangered Species Act</td>
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<td>ESRC</td>
<td>Endangered Species Recovery Committee (State of Hawai’i)</td>
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<td>FFS</td>
<td>French Frigate Shoals</td>
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<tr>
<td>GIS</td>
<td>Geographic Information Systems</td>
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<td>ha</td>
<td>hectare</td>
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<tr>
<td>HAPE</td>
<td>Abbreviation for Hawaiian Petrel</td>
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<td>HCP</td>
<td>Habitat Conservation Plan</td>
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<td>HNP</td>
<td>Hono O Nā Pali</td>
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<td>HNP NARS</td>
<td>Hono O Nā Pali Natural Area Reserve System</td>
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<td>HRS</td>
<td>Hawai’i Revised Statutes</td>
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<tr>
<td>IA</td>
<td>Implementing Agreement</td>
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<tr>
<td>IE</td>
<td>Implementing Entity</td>
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<tr>
<td>ITL</td>
<td>Incidental Take License</td>
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<td>ITP</td>
<td>Incidental Take Permit</td>
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<tr>
<td>IUCN</td>
<td>International Union for Conservation of Nature</td>
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<td>KESRP</td>
<td>Kaua’i Endangered Seabird Recovery Project</td>
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<td>KISC</td>
<td>Kaua’i Invasive Species Committee</td>
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<td>KIUC</td>
<td>Kaua’i Island Utility Cooperative</td>
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<tr>
<td>Km</td>
<td>Kilometer</td>
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<tr>
<td>KPNWR</td>
<td>Kilauea Point National Wildlife Refuge</td>
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<tr>
<td>KSHCP</td>
<td>Kaua’i Seabird Habitat Conservation Plan</td>
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<tr>
<td>KWA</td>
<td>Kaua’i Watershed Alliance</td>
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<tr>
<td>mya</td>
<td>Million years ago</td>
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<tr>
<td>MBTA</td>
<td>Migratory Bird Treaty Act</td>
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<tr>
<td>MHI</td>
<td>Main Hawaiian Islands</td>
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<tr>
<td>NARS</td>
<td>Natural Area Reserve System</td>
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<tr>
<td>NEPA</td>
<td>National Environmental Policy Act</td>
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<td>NESH</td>
<td>Abbreviation for Newell’s Shearwater</td>
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<td>NHPA</td>
<td>National Historic Preservation Act</td>
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<td>NLCZ</td>
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<td>NMFS</td>
<td>National Marine Fisheries Service</td>
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<td>NOAA</td>
<td>National Oceanic and Atmospheric Administration</td>
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<td>NPS</td>
<td>National Park Service</td>
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<tr>
<td>NTBG</td>
<td>National Tropical Botanical Garden</td>
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<tr>
<td>NWHI</td>
<td>Northwest Hawaiian Islands</td>
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<tr>
<td>OEQC</td>
<td>Office of Environmental Quality Control</td>
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Kauai Seabird Habitat Conservation Plan
PCSU  Pacific Cooperative Studies Unit
PIP   Participant Inclusion Plan
RCUH  Research Corporation at the University of Hawai‘i
SHPO  State Historic Preservation Officer
SOS   Save Our Shearwaters
SST   Surface Seawater Temperature
TMK   Tax Map Key
TNC   The Nature Conservancy
ULP   Upper Limahuli Preserve
UMP   Underline Monitoring Program
USDA  U.S. Department of Agriculture
USGS-PIERC U.S. Geologic Survey Pacific Island Environmental Research Center
USFWS U.S. Fish and Wildlife Service
WSART Worker Seabird Awareness and Response Training
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1. **INTRODUCTION**

Nighttime lighting is an essential activity in most homes, businesses and industry centers. The Kaua‘i Seabird Habitat Conservation Plan (hereinafter referred to as “KSHCP” or “Plan”) was developed to provide an island-wide conservation program to support the use of wildlife-friendly nighttime lights; to mitigate for unavoidable incidental take impacts¹ to listed seabirds caused by nighttime lighting; to avoid and minimize take, and to facilitate the regulatory processes for Applicants to obtain authorization, as appropriate; to incidentally take listed seabirds (Table 1-1). The KSHCP was developed by the State of Hawai‘i, Department of Land and Natural Resources (DLNR) with technical assistance from the U.S. Fish and Wildlife Service (USFWS), and in consultation with various scientific experts in the field of seabird and turtle biology.

The KSHCP is similar to a general conservation plan (GCP) as described in USFWS policy (USFWS 2007) except that it is being prepared by DLNR rather than USFWS; this approach is further discussed in Chapter 3. It was developed to support incidental take permit (ITP) and incidental take license (ITL) applications from multiple, qualifying non-Federal entities that have the potential for causing unavoidable take of Kaua‘i’s listed seabirds or honu. The seabirds covered in the KSHCP are the ‘a‘o, ‘ua‘u and the ‘akē‘akē, collectively referred to as “Covered Seabirds”. The honu is also covered under this HCP. All of these species are collectively referred to as the “Covered Species” (Table 1-1).

Based on the potential for incidental take of these Covered Seabirds, Applicants may request an ITL under §195D-4(g) of the Hawai‘i Revised Statutes (HRS), and an ITP pursuant to Section 10(a)(1)(B) of the Endangered Species Act (ESA) of 1973, as amended. It is anticipated that take of honu will be avoided through monitoring and measures to protect turtle nests. Federal agencies have a separate process to address take and other impacts to listed species, as provided for under the consultation processes of Section 7 of the ESA.

<table>
<thead>
<tr>
<th>Hawaiian name</th>
<th>Common Name</th>
<th>Latin Name</th>
<th>Conservation Status</th>
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<tr>
<td>‘a‘o*</td>
<td>Newell’s shearwater</td>
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<td>‘ua‘u</td>
<td>Hawaiian petrel</td>
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<td>‘akē‘akē</td>
<td>band-rumped storm-petrel</td>
<td><em>Oceanodroma castro</em></td>
<td>Federally Endangered State Endangered IUCN Red List Least Concern</td>
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<td>honu</td>
<td>green sea turtle</td>
<td><em>Chelonia mydas</em></td>
<td>Federally Threatened State Threatened IUCN Red List Endangered</td>
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*Throughout the KSHCP Hawaiian names of Covered Species are used.
Non-Federal entities or Applicants seeking ITLs and ITPs (also collectively referred to below as a “permit” or “permits”) under the KSHCP would be seeking authorization for incidental take of the Covered Seabirds under specific terms and conditions defined by the Plan. Under the KSHCP, the impacts of any authorized incidental taking of the Covered Seabirds would be minimized and mitigated to the maximum extent practicable and offset with a net recovery benefit for the species affected. The duration of the Plan is 30 years; however, the term of individual permits under the Plan may vary within that 30-year KSHCP period. Other components of the HCP specific to individual Applicants include minimization and monitoring at Applicant facilities.

Covered Activities addressed under the KSHCP are: (1) the placement and operation of light structures that can cause disorientation of fledgling and adult seabirds, and hatchlings of the honu; (2) the placement and operation of new or future lights that have similar effects; and (3) conservation measures to mitigate the impacts of the taking on the Covered Species. The location of Covered Activities encompasses anywhere on the island of Kaua‘i where light structures may occur, and State Lands where mitigation will occur.
1.1 PLANNING BACKGROUND OF THE KSHCP

The KSHCP is an atypical HCP and unique in several important respects. Planning for and development of the KSHCP was influenced by the following factors described below.

First, on the island of Kaua‘i, interactions of listed seabird species with existing lights has been a longstanding issue impacting the species. For the last three decades, as development on Kaua‘i has steadily increased, take of listed seabirds by their attraction to artificial lighting has been documented (Ainley et al. 1995, 2001). Island-wide estimates point to high amounts of incidental take occurring (involving hundreds of individuals of the covered listed seabird annually), that are negatively impacting the Covered Species (especially the ‘a‘o) and presenting challenges for achieving seabird conservation on Kaua‘i. The creation of the KSHCP was viewed as a critical tool to minimize and mitigate the effects of lighting on the Covered Species. The annual, ongoing nature of the take impacts on Kaua‘i contrasts with typical HCPs where the impacts of the taking on listed species are likely to occur after approval of an HCP and issuance of an ITP or ITL.

Second, the distribution of light attraction-related impacts to listed seabirds is widespread across the island. Downed birds are found wherever there is concentrated use of artificial outdoor lighting. Thus, the incidental take of Covered Seabirds involves multiple entities across different sectors, including private businesses and resorts as well as public agencies. Individual Applicants to the KSHCP will have differing take levels due to site-specific factors such as the specific location and extent of their facilities.

Third, conducting conservation actions to mitigate for the effects of unavoidable take of Covered Seabirds is difficult and costly due to the low reproductive capacity of the Covered Seabirds, their cryptic nature, the remote and rugged terrain on Kaua‘i in which they now breed and other factors. The challenging conditions for implementing actions in and near seabird colonies on Kaua‘i make it especially important to coordinate conservation efforts under the KSHCP to achieve the most cost-effective mitigation.

Another unique aspect of the KSHCP is its extended planning history. The concept of an island-wide HCP was developed, and initial outreach to potential Applicants began in 2005. Over 100 businesses and other entities were contacted, resulting in many voluntary changes at facilities to avoid and minimize take of the Covered Seabirds by installation of seabird friendly lighting and an overall reduction in the number of lights of Kaua‘i. Changes to lighting at some specific facilities were the result of litigation and settlement agreements. During the subsequent decade-long development process, some entities have determined that minimization alone will not completely avoid incidental take, and these entities are the expected pool of Applicants under the KSHCP.
1.2 REGULATORY FRAMEWORK

1.2.1 FEDERAL ENDANGERED SPECIES ACT (ESA)
The purpose of the ESA is to protect and recover endangered and threatened species and the ecosystems upon which they depend. Section 9 of the ESA and Federal regulation pursuant to Section 4(d) of the ESA prohibit the “take” of endangered and threatened species without special exemption. Under the ESA, “take” is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct (16 USC § 1532(19)). “Harm” is further defined by the USFWS to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering (50 CFR 17.3). “Incidental take” is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity.

Pursuant to Section 11(a) and (b) of the ESA, any person who knowingly violates Section 9 of the ESA or any permit, certificate, or regulation related to Section 9, may be subject to civil penalties of up to $25,000 for each violation or criminal penalties up to $50,000 and/or imprisonment of up to one year for each violation.

Individuals and State and local agencies proposing an action that is expected to result in the incidental take of Federally listed species are encouraged to apply for an incidental take permit (ITP) under Section 10(a)(1)(B) of the ESA to be in compliance with the law. Such permits are issued by USFWS when take is not the purpose of the action and is incidental to otherwise lawful activities. An application for an ITP must be accompanied by a habitat conservation plan, commonly referred to as an HCP. The regulatory standard for an ITP under Section 10(a)(1)(B) of the ESA requires that the applicant’s HCP minimize and mitigate the impacts of take on the listed species to the maximum extent practicable; not appreciably reduce the likelihood of the survival and recovery of the affected listed species in the wild; and provide adequate funding for its implementation and provide procedures to deal with unforeseen circumstances.

Section 7(a)(2) of the ESA requires Federal agencies to ensure that their actions, including the issuance of permits, do not jeopardize the continued existence of listed species or destroy or adversely modify listed species’ designated critical habitat. “Jeopardize the continued existence of...” pursuant to 50 CFR 402.2, means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species. Therefore the proposed issuance of an ITP under Section 10(a)(1)(B) of the ESA by the USFWS is a Federal action subject to Section 7 of the ESA. On that basis, the USFWS is required to conduct an internal consultation to affirm compliance with the requirements of Section 7(a)(2).

1.2.2 NATIONAL ENVIRONMENTAL POLICY ACT
The purpose of the National Environmental Policy Act (NEPA) of 1969, as amended (42 U.S.C. § 4321 et seq.) is to ensure that, before Federal agencies make decisions (in this case deciding
whether to issue an ITP), they consider the effects of their actions on the human environment. NEPA serves as an analytical tool to assess direct, indirect, and cumulative impacts of a proposed action and alternatives. The USFWS must comply with NEPA before it makes an ITP decision. The USFWS is preparing a programmatic NEPA compliance document on the KSHCP with the intent of streamlining NEPA compliance for individual permit decisions.

1.2.3 National Historic Preservation Act
The National Historic Preservation Act (NHPA) of 1966 (54 U.S.C. 300101 et seq.) established a comprehensive program to preserve the historical and cultural foundations of the nation as a living part of community life. Section 106 of the NHPA requires Federal agencies to consider the effects of projects they carry out, approve, or fund on historic properties included on or eligible for inclusion on the National Register of Historic Places. Historic properties also include properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization, so long as that property also meets the criteria for listing in the National Register. The issuance of ITPs is considered a Federal undertaking under Section 106 of the NHPA. Section 106 requires that the USFWS assess and determine if the undertaking has the potential to impact historic properties. This assessment may require consultation with the State Historic Preservation Office (SHPO) and appropriate Native Hawaiian groups and other affected parties.

1.2.4 Federal Migratory Bird Treaty Act
The Migratory Bird Treaty Act (MBTA) of 1918, as amended (16 USC § 703-712), prohibits the take of migratory birds and makes it unlawful to pursue, hunt, take, capture, kill, possess, offer to or sell, barter, purchase, deliver or cause to be shipped, exported, imported, transported, carried or received any migratory bird, part, nest, egg or product without proper authorization. The avian Covered Seabird Species are protected under the MBTA. Pursuant to USFWS policy, an ITP also constitutes a Special Purpose Permit under 50 CFR § 21.27 for the take of ESA-listed migratory bird species (in this case, the ‘ua’u, ‘a’o and ‘akē‘akē), as long as the permit holder maintains compliance with the ITP terms and conditions. Under those circumstances, the take of ESA-listed migratory birds will not be considered a violation of the MBTA.

USFWS regulations require a permit for the banding or marking of migratory birds protected under the MBTA. Any bird banding conducted as part of the KSHCP conservation program will be conducted by persons with Federal and State banding permits.

1.2.5 Hawai‘i Revised Statutes, Chapter 195D
Chapter 195D of the HRS defines the State’s responsibilities with respect to species listed as endangered or threatened to protect and conserve native wildlife and their habitats, including species Federally listed as endangered or threatened. Under the provisions of HRS § 195D, species listed as endangered or threatened pursuant to the ESA are also listed as an endangered or threatened species by the State of Hawai‘i law (HRS §195D-4). Section 195D-2 defines “take” similarly to the Federal ESA. Section 195D-3 expressly prohibits, except as permitted by rules, any person to take, possess, transport, transplant, export, process, sell,
offer for sale, or ship any species that the DLNR has determined to be in need of conservation (see also §195D-4(e)).

Section 195D-21 states that the State of Hawai‘i may enter into an HCP if standards are met as defined in the statute. Section 195D-25 defines the composition and role of the Endangered Species Recovery Committee (ESRC) to provide guidance to the DLNR and the Board of Land and Natural Resources (BLNR) on matters relating to endangered, threatened, proposed, and candidate species. The ESRC is comprised of biological experts, representatives of relevant Federal and State agencies (e.g., USFWS, United States Geologic Survey (USGS), DLNR), and other appropriate governmental and non-governmental members. The ESRC reviews all HCP permit applications and makes recommendations to the BLNR on whether they should be approved, amended, or rejected. The ESRC also reviews all existing HCPs and ITLs annually to ensure compliance, and recommend any necessary changes to HCPs. Chapter 343 of the HRS and its implementing regulations (HAR §11-200) establish a system of environmental review to ensure that environmental concerns are given appropriate consideration in decision-making along with economic and technical considerations. The Hawai‘i Office of Environmental Quality Control (OEQC) is responsible for environmental oversight and review under Chapter 343. Section 343-5 mandates the preparation of an Environmental Assessment (EA) or an Environmental Impact Statement (EIS) for activities by agencies [§343-5(a)] or applicants [§343-5(b)] meeting certain conditions.

The KSHCP proposes use of State lands as part of its conservation program and the potential use of State and County of Kaua‘i funds, both of which trigger the need for compliance with HRS 343. KSHCP compliance with Chapter 343 will be satisfied by a joint document prepared for NEPA and HEPA compliance.
2. **ENVIRONMENTAL SETTING**

2.1 **ISLAND OF KAUA‘I**

The island of Kaua‘i lies at the northernmost end (22°03’N, 159°30’W) of the Main Hawaiian Islands (MHI) and is the oldest of the eight main islands (Figure 2-1). Measuring 884km² - 51km east-west and 35km north-south - Kaua‘i is the fourth largest of the main islands in the Hawaiian archipelago. The island is characterized by steep cliffs and deeply eroded canyons and valleys. The north and east coasts receive wind and moisture carried on the trade winds and support lush vegetation, streams, and waterfalls, while the south and west coasts receive minimal moisture and are typically hot and arid. The island supports many valuable natural plant and animal communities including montane bogs, montane wet forest, lowland mesic forest, lava tube caves, long stretches of sandy beach, and many streams and rivers. Because of the age of the island and its relative isolation, Kaua‘i contains higher levels of endemism than elsewhere in the State (Mitchell et al. 2005).

![Figure 2-1. Map of the southeastern Hawaiian Islands, also referred to as the Main Hawaiian Islands (MHI). Source ccma.nos.noaa.gov](image)

2.1.1 **CLIMATE**

The climate and weather of Kaua‘i is a function of isolation and its location in the tropical North Pacific Ocean, approximately 3540km from the nearest continent. There are significant contrasts in average precipitation and temperatures in different locations on the island. Like the other MHI, the climate varies around the island based on elevation above sea level, altitude-related temperature changes, topography, relative exposure to sunlight, and prevailing winds, especially the trade winds originating from the northeast (NOAA 1985). Trade winds are prominent drivers of climate and weather from May through September when the trades are prevalent 80 to 95% of the time. From October through April, the effects of the trade winds are less prominent across the island (NOAA 1985).
Kaua‘i receives varied amounts of annual rainfall at different locations on the island (Figure 2-2). Mount Wai‘ale‘ale is one of the wettest spots on earth receiving an average of more than 1117cm of rain a year (State of Hawai‘i 2010). As a whole, the island of Kaua‘i receives an average of over 100cm of rainfall. Three-quarters of this total, on average, falls during the seven-month wet season, from October through April. Average precipitation in January, the wettest month, is over 15cm; June, the driest month, receives only about 9.66cm of rain.

![Average Annual Precipitation in Kaua‘i](image)

**Figure 2-2.** Average annual participation on Kaua‘i. Source: Oregon Climate Service (August, 1998).

Hurricanes, (storms with winds in excess of 120km/h) have occurred in the MHI five times over a 62-year period (State of Hawai‘i 2010). Tropical storms caused by low pressure systems are more frequent and may be similar to hurricanes but with more modest winds, below 120km/h. Studies based on weather satellite photographs suggest that tropical storms affect areas within the State of Hawai‘i every year or two (NOAA 1985). Hurricanes and tropical storms are most likely to occur during the last half of the year, from July through December.

In the past 50 years, strong winds, heavy rains and storm surges caused by periodic hurricanes have resulted in devastating effects (Table 2-1). Hurricanes ‘Iwa (1982) and ‘Iniki (1992) caused extensive damage to native plant communities and ‘Iniki also damaged buildings, roadways, utility structures and outdoor lighting.

<table>
<thead>
<tr>
<th>Name</th>
<th>Date</th>
<th>Maximum winds recorded onshore (km/h)</th>
<th>Saffir-Simpson</th>
<th>Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘Iwa</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>‘Iniki</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sustained</td>
<td>Peak gusts</td>
<td>Hurricane Scale</td>
<td>Property Damage (mil. $)</td>
</tr>
<tr>
<td>----------------</td>
<td>-----------</td>
<td>------------</td>
<td>-----------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>Hiki</td>
<td>Aug. 15-17, 1950</td>
<td>109</td>
<td>(NA)</td>
<td>Tropical Storm</td>
</tr>
<tr>
<td>Niña</td>
<td>Dec. 1-2, 1957</td>
<td>(NA)</td>
<td>148</td>
<td>1</td>
</tr>
<tr>
<td>Dot</td>
<td>Aug. 6, 1959</td>
<td>130</td>
<td>165</td>
<td>2</td>
</tr>
<tr>
<td>‘Iwa</td>
<td>Nov. 23, 1982</td>
<td>104</td>
<td>188</td>
<td>3</td>
</tr>
<tr>
<td>‘Iniki</td>
<td>Sept. 11, 1992</td>
<td>148</td>
<td>230</td>
<td>4</td>
</tr>
</tbody>
</table>

Source: Adapted from Table 5.45 in State of Hawai‘i (2010)

2.1.2 Topography/Geology

Kaua‘i, as well as Ni‘ihau and Ka‘ula, are the eroded emergent remains of three shield volcanoes that stand in over 3600m of water. Kaua‘i was formed during two periods of volcanism between 5.6 million and 3.6 million years ago (mya) (Blay and Siemers 2004). Originally a broad basaltic shield volcano, Kaua‘i was formed by thin sheets of lava gently sloping from the summit. Following the initial period of volcanism, rain, streams, and waves eroded more than 143,226 ha of the island creating: steep sea cliffs; deep canyons and valleys that extend from the interior of the island to the coast; a mountainous interior; a broad coastal plain with deep soil; and extensive beaches (Blay and Siemers 2004).

Roughly circular in shape, Kaua‘i contains striking physiographic features: a high central plateau topping out at over 1500m at the summits of Wai‘ale‘ale (1570m) and Kawaikini (1600m); steep cliffs and deeply incised valleys along the northern Nā Pali coast; the 1100m deep Waimea Canyon; the broad Līhu‘e Basin on the southeastern quadrant of the island; and the extensive coastal dunes of Polihale.

The northern area of the island extends from Kalihiwai to Hā‘ena, where the Nā Pali coast begins, the roads end, and the landscape transitions to regions of incised valleys and steep sea cliffs (300-600m tall). The north shore valleys include Hanalei, Lumaha‘i, Wainiha, Hanakāpī‘ai, Hanakoa, Kalalau, Honopū, Nu‘alolo, and Miloli‘i. The area around Līhu‘e has a low, sloping topography flanked by the Hāʻupu Ridge to the south.

2.1.3 Hydrology/Streams, Rivers, Drainages

Kaua‘i’s hydrology is dominated by 61 streams that radiate out from the Wai‘ale‘ale-Kawaikini massif in all directions, 45 of which are perennial (State of Hawai‘i 2010). All significant slopes on Kaua‘i, except the west slope, carry these perennial streams.
2.1.4 EXISTING LAND USE

In recent history, the economy of Kaua‘i has been a blend of agriculture, tourism and military sectors. Today, the service sectors provide most of the jobs on Kaua‘i, in particular tourism. For most of the past decade, the annual visitor count for Kaua‘i was approximately 1 million people (DBEDT 2016).

The 2010 Census counted the Kaua‘i total population at 67,091 persons (U.S. Census Bureau 2011). Concentrations of development and human populations occur primarily in the coastal areas of the west, south, east and north shores, excluding the undeveloped and rugged Nā Pali Coast in the northwest. The west side of Kaua‘i is sparsely populated. The highest human population densities exist in the towns of Līhu‘e and Kapa‘a on the east coast while the rest of the island features smaller towns and resort areas along the coast.

Kaua‘i has experienced a conversion of land use from agriculture to residences, with many subdivisions featuring large-scale estates. For seabirds, this pattern may have potential to result in increased light attraction effects from lights encroaching into previously dark areas.
3. PLAN DESCRIPTION

The KSHCP is an island-wide conservation plan under which each individual Applicant may receive a separate ITP and ITL authorizing incidental take of the Covered Species. The intent in developing the KSHCP was to make it similar to a GCP as described in USFWS policy (USFWS 2007) for streamlining the regulatory processes associated with developing HCPs under Section 10(a)(1)(B) of the ESA. This approach allows for the development of a programmatic HCP suitable to meet the needs of a local area (e.g., the island of Kaua’i) that will streamline NEPA and other requirements and allow issuance of individual ITPs and ITLs to landowners who apply for such permits and demonstrate compliance with the terms and conditions of the GCP.

The GCP-level approach allows coordinated, cost-efficient and effective conservation actions (Section 5.4) to occur under the KSHCP to achieve long-term biological goals and objectives (Sections 5.1 & 5.2) needed to offset incidental take impacts by individual applicants, and to provide a net benefit to the Covered Species as required by State of Hawai‘i law (HRS § 195D-30). The KSHCP involves multiple Participants (entities that receive an ITP and ITL) under one plan, and recognizes that many entities on Kaua’i have a desire to comply with Federal and State endangered species statutes, and to adequately address the adverse effects of light attraction on the Covered Species. This sentiment reflects the fact that lights are widespread on Kaua’i and involve nearly all sectors of industry. By creating the KSHCP to meet the requirements of ITP/ITL issuance criteria, it eliminates the need for each non-Federal entity on Kaua’i to develop their own HCP for the purposes of receiving an ITP and ITL addressing take of the Covered Species.

Under the KSHCP, private businesses, landowners, cruise ships that dock at Kaua’i ports, and non-Federal public agencies on Kaua’i that conduct actions with the potential to cause incidental take of the Covered Species may submit an application for an ITP and an ITL and request incidental take authorization as appropriate to their site-specific situation. The application will be in the form of a Participant Inclusion Plan (PIP) specific to Applicant facilities (see Section 6.2.2 for details on PIPs). The KSHCP defines acceptable scientific approaches for estimating an Applicant’s anticipated level of take, for monitoring the effect of the applicant-authorized taking, and for establishing minimization measures and mitigation actions, including long-term management, monitoring and reporting responsibilities to adaptively manage and implement the KSHCP. Evaluation of permit issuance criteria for individual permit applications will be based on adherence to the standards and actions delineated in the KSHCP, and acceptable minimization actions for individual applicants as outlined in PIPs.

Participation in the KSHCP is voluntary and is based on individual Applicant’s risk assessments, which in turn are based on records of take of listed seabirds at their facilities. The conservation program under the KSHCP was designed to offset anticipated take impacts of listed seabirds based on pre-application PIPs submitted to the USFWS and DLNR by prospective participants. The location of Covered Activities encompasses light attraction anywhere on the island of Kaua’i where light structures may occur, and State Lands where mitigation will occur.
3.1 ACTIVITIES COVERED BY THE PERMITS

Two primary categories of Covered Activities likely to cause take of Covered Seabirds are addressed under the: (1) artificial nighttime lighting; and (2) conservation program activities. Each of these categories is discussed below. The mechanism and effects of each of the Covered Activities are described in Chapter 4 (Section 4.2).

3.1.1 ARTIFICIAL LIGHTING

The KSHCP covers incidental take requests involving a full range of lighting types present on Kaua‘i. Kaua‘i contains a variety of lighting types, the specific type and intensity of which depend upon the purpose for the lighting. Under the KSHCP, all types of artificial lighting including land-based lights found at parks, retail stores, resorts, condominium complexes, agribusiness and industrial facilities, as well as lighting on ocean-going vessels such as cruise ships, can be addressed in PIPs. Artificial lighting includes the placement and operation of current light structures, as well as the placement and operation of new or future lights that have similar effects.

Outdoor lighting fixtures may include, but are not limited to:

- Street lights;
- Parking lot lights;
- Security lights;
- Searchlights, spotlights and floodlights;
- Building and structural or architectural lights;
- Building overhang and canopy lights;
- Landscape lights;
- Recreational lights;
- Signage lights; and
- Product display area lights.

Applicants to the KSHCP must submit a PIP, which provides detailed information on outdoor lighting, such as:

- Light type
- Make & model
- Light output (e.g. lumens) & bulb type
- Bulb color
- Quantity (number of fixtures)
- Location
- Purpose of the lights
- Direction of light angle (e.g. up, down, out)
- Full cut-off/shielded fixture (yes/no)
- Time on/Time off
In addition, PIPs must describe any lighting standards required for facility operations or other requirements that necessitate the use of lighting (e.g., required for security, safety, operations) and any plans for future lights.

### 3.1.2 Conservation Program Activities

The KSHCP conservation program, described in detail in Appendix A: Kahuama’a Seabird Preserve Management Plan, is comprised of several activities that collectively may have the potential to “take” individuals of the Covered Seabirds. These mitigation activities include establishment of a seabird social attraction site (SAS) and construction of a predator-proof fence (PPF) enclosing approximately 2ha of suitable seabird breeding habitat.

Comprehensive take-avoidance measures and protocols have been developed to prevent adverse impacts to the Covered Seabirds as a result of these mitigation activities. The specific mitigation activities are summarized below. A complete description of these mitigation actions is provided in the Management Plan (Appendix A).

- Construction and long-term maintenance of the 2ha PPF enclosure;
- Installation and long-term maintenance of social attraction equipment (speakers, solar panels, artificial burrows) within the 2ha PPF enclosure;
- Eradication of predators from within the 2ha PPF enclosure and implementation of long-term predator control at the site;
- Monitoring for predator incursions within the 2ha PPF enclosure;
- Barn owl control around the preserve and in the surrounding Kalalau Valley area;
- Feral cat control at ingress points to the SAS and neighboring source colonies in the Kalalau Valley;
- Invasive plant control and vegetation control within the 2ha PPF enclosure and along a 50m ‘predator defense zone’ outside the fence;
- Monitoring of the Covered Seabirds and their burrows/artificial nest boxes, including the physical handling and banding of birds by trained, federally permitted staff;
- Monitoring of other listed species (plants, forest birds, etc.) within the 2ha PPF enclosure; and
- Downed seabird recovery, evaluation, rehabilitation and release to sea.

KSHCP biologists, contractors and technicians implementing mitigation activities will be required to adhere to the take-avoidance measures and protocols referred to as Best Management Practices (BMPs) in the Management Plan (Appendix A). The KSHCP Prime Contractor will ensure that all individuals with 1) a designated role to perform research or any handling of listed species necessary for mitigation monitoring activities and/or 2) a designated role to conduct removal of barn owls protected under the MBTA, shall have the necessary required qualifications and permits in advance of doing the work.

The KSHCP Prime Contractor will also ensure that all BMPs are followed and when necessary recommend changes or additions to these BMPs that will be included in the annual KSHCP reports to the USFWS and DLNR for approval and implementation.
3.2 COVERED WILDLIFE SPECIES

As discussed above, the KSHCP addresses: the ‘a’o (*Puffinus auricularis newelli*), the ‘ua’u (*Pterodroma sandwichensis*) and the ‘akē’akē (*Oceanodroma castro*). Each of these birds is vulnerable to light attraction, particularly during their post-fledging departure from the breeding colony site, but also as adults. The distribution, abundance, population trends, life history, habitat selection and threats for each of these species are described in detail in *Appendix B: Covered Species Biological Details*.

The KSHCP primarily addresses the effects of light attraction on the Covered Seabirds, but also addresses the effects of artificial lighting on the honu (*Chelonia mydas*). Honu also breed on Kaua‘i, and hatchlings may become disoriented by artificial night time lighting (one of the Covered Activities, Section 3.1). No take of honu is anticipated under the KSHCP due to take avoidance and minimization provisions under the Plan. All relevant turtle information that was relied upon in the KSHCP (e.g. see the sections on effects of Covered Activities, estimating take, monitoring and minimization) is presented in *Chapter 9*. Information on honu distribution, abundance, population trends, life history, habitat selection and threats on Kaua‘i is described in detail in *Appendix B: Covered Species Biological Details*.

3.3 WHAT IS NOT COVERED IN THE KSHCP

The KSHCP does not address incidental take of any other listed species, including plants or invertebrates, resulting from any of the Covered Activities, including installation of new lights. The maintenance and operation of all facilities and other structures covered under an ITL or ITP in association with the KSHCP shall avoid take of other listed species. If incidental take of species not covered under the KSHCP is likely to occur in conjunction with a specific ongoing or proposed Covered Activity, the Applicant would be ineligible to participate in the KSHCP (unless this take was covered under a separate HCP or through a similar regulatory process). Under those circumstances, the Applicant would need to obtain take authorization for all requested activities and species through a separate ITL and ITP, as appropriate.

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1 While the ESA does not prohibit take of listed plants, the State of Hawai‘i under HRS 195D-4 does prohibit take of listed plants and may issue temporary incidental take licenses under its provisions.
4. EFFECTS OF THE KSHCP COVERED ACTIVITIES ON THE COVERED SEABIRDS

This chapter describes the effects of KSHCP Covered Activities (artificial lighting and the KSHCP conservation program) on the Covered Seabirds. The effects of KSHCP Covered Activities on honu are discussed in Chapter 9.

4.1 EFFECTS OF THE KSHCP CONSERVATION PROGRAM

The KSHCP conservation program includes a social attraction project to establish an ‘ā’o population within a 2ha fenced area. Predator fencing, predator removal and invasive plant species management are proposed as part of the social attraction project to protect seabird breeding habitat from degradation and non-native terrestrial predators which prey on seabird eggs, chicks, juveniles and adults. The KSHCP conservation program also includes barn owl and feral cat management activities to protect populations of the ‘ā’o, ‘ua’u and ‘akē’akē from these predator species. The social attraction project and barn owl and feral cat management activities will be conducted to facilitate successful seabird reproduction and survival to an extent that provides a net conservation benefit over the 30-year duration of the Plan relative to the number of Covered Seabirds that are likely to be subject to take due to nighttime lighting activities on Kaua‘i. As noted above in Chapter 2, the KSHCP conservation program also includes recovery, evaluation, rehabilitation and release to sea of “downed” (i.e. those who land from exhaustion after being attracted to artificial lights) Covered Seabirds.

4.1.1 SEABIRD SOCIAL ATTRACTION PROJECT - KAHUAMA‘A SEABIRD PRESERVE

Implementation of the seabird social attraction project at the Kahuama‘a Seabird Preserve is expected to benefit the ‘ā’o. These benefits were estimated in terms of the increase in protected habitat as well as enhancement of the reproduction, numbers and distribution within the Preserve compared to existing baseline conditions for the species in this region of Kaua‘i.

The 2ha mitigation/social attraction site is located on Kalalau Rim in northwestern Kaua‘i at approximately 1,050m in elevation (i.e. mid- to high-elevation) at a similar elevation to occupied ‘ā’o nesting colonies in that region of the island. The habitat and topography were determined to be suitable for predator-proof fencing (L. Young, 2017, pers. comm.). Construction of a predator-proof fence around the native plant dominated habitat at the site will create a montane ecological system closed to terrestrial predators. Within the fenced site, breeding pairs will be attracted using a sound system after eradication of feral cats, rats, and ungulates (pigs, goats, and deer) is implemented. A cat and rodent control grid will also extend 50m around the outside perimeter of the fence to minimize or avoid future terrestrial predator invasion into the fenced site. Barn owl trapping and shooting will be carried out around the perimeter of the fence to protect seabirds recruited to and breeding within the preserve. Non-native, invasive weeds will also be removed within the fenced site to protect existing, native-dominated vegetation and prevent degradation of suitable seabird habitat.

Given the close proximity of known ‘ā’o breeding colonies to the social attraction site and the estimated flight paths of shearwaters using this area (USFWS 2017c, a) there is a high likelihood...
that prospecting shearwater adults and sub-adults will visit the site and be exposed to social attraction cues. The social attraction site will be managed for the 30-year term of the KSHCP. Therefore, benefits to the ‘a’o population on Kaua’i are anticipated to occur until the end of the 30 year period, once the predator-proof fence is completed, predators are removed from the fenced area, and the social attraction is initiated and successful in establishing breeding seabirds within the fenced area.

The long-term management of the 2ha site, which currently contains high quality breeding habitat for seabirds at a level that may support large numbers of nesting seabirds, is critical to support recovery of the ‘a’o. This will establish a new breeding colony within a fully protected, terrestrial predator-free area in a native-plant dominated montane ecosystem on the island of Kaua’i. Predation and light impacts contribute to the range-wide endangerment of the ‘a’o (USFWS 2017c). The KSHCP conservation program will support the recovery needs of the ‘a’o as those needs are described in the Newell’s Shearwater Landscape Strategy (USFWS 2017c), by creating and managing a new colony through social attraction in an area with minimal light impacts while mitigating threats at the colony.

Population modeling was used to calculate the anticipated increase in ‘a’o reproduction of the population that will be recruited to and breed within the protected, fenced and managed site (Appendix C: Social Attraction Benefit Estimator). ‘A’o reproduction and survival are impacted by predation at nesting colonies, from late March/early April through mid-November (Raine et al. 2017h). Thus, the beneficial effects for individual shearwaters are anticipated to occur during the breeding season. The beneficial effect on reproduction can be expressed as a change in the number of fledglings produced by the ‘a’o pairs anticipated to breed within the fenced site compared to the existing condition for pairs breeding outside the fence. Based on surveys conducted at the site, there may already be some level of on-site breeding activity (Appendix A: Kahuama’a Seabird Preserve Management Plan). Between May 31 and June 3, 2016 and August 28-30, 2017, KSHCP staff conducted auditory surveys at the site and observed ‘a’o transiting over the site, circling, and possibly calling from the ground on more than one occasion. However, because breeding is unconfirmed, the modeling of population change within the fence is assumed to have a starting population size of zero.

Based on the results of the population modeling, implementation of the seabird social attraction project over a 30 year period is anticipated to provide a reproductive benefit of 697 fledglings to the Kaua’i ‘a’o population (Appendix C: Social Attraction Benefit Estimator, Table 7). This benefit relies on the following assumptions: (1) completion of a predator exclusion fence protecting 2ha of native habitat by Year 2 of the KSHCP, (2) eradication of terrestrial predators within the fence (100% efficacy of removing feral cats, rats and ungulates) by Year 2, (3) initiation of social attraction in Year 2, (4) initiation of barn owl control around the perimeter of the fence in Year 1 (80% efficacy, discussed in Section 4.1.2), and (5) 10% of prospecting sub-adult birds are available for recruitment to the site (i.e., sub-adults, ages 2-5 years old, returning to Kaua’i during the breeding season to prospect for nest sites and potential breeding partners). The 100% efficacy in terrestrial predators (ungulates, cats, rats) removal was considered achievable based on the successful eradication of these species in
densely forested habitat within the Nihoku predator exclusion fence located at the Kilaeua Point National Wildlife Refuge (PRC 2017). Additional information on ‘a’o modeling assumptions for site fidelity, flight paths, burrow density and Kaua’i population size are provided in Appendix C: Social Attraction Benefit Estimator. Although model outputs indicate the social attraction project could provide a reproductive benefit up to a maximum of 1,045 fledglings, the conservative estimate of 697 fledglings (Appendix C: Social Attraction Benefit Estimator, Table 7) was selected to provide a very high level of confidence and certainty in the reproductive outcome that will result from implementation of the project.

Establishing a seabird breeding colony in a terrestrial predator-free enclosure through the broadcasting of breeding calls is an effective and proven conservation tool (Gummer 2003, Sawyer and Fogle 2010, McIver et al. 2016). Jones and Kress (2012) evaluated 128 seabird restoration projects implemented to protect 47 seabird species in 100 locales in 14 countries worldwide. Many of the projects (73 of the 128) used either only acoustic playback or a combination of decoys and acoustics to attract seabirds. Thirty-four percent (16 of 47) of those projects aimed to restore threatened or critically endangered seabird species populations. The most successful seabird restoration projects worldwide (83% of successful projects) involved seabird species in the taxonomic family Procellariidae, in which the ‘a’o belongs, demonstrating the high level of confidence in this restoration approach for the ‘a’o.

4.1.2 Barn Owl and Feral Cat Control in Kalalau Valley

The benefits to the Covered Seabird populations from implementation of barn owl control and feral cat control in Kalalau Valley were estimated in terms of seabird distribution, reproduction, and numbers. Barn owl control will consist of trapping and shooting, carried out monthly, or as-needed, in identified territories of barn owls within Kalalau Valley. Observations by DLNR-DOFAW avian predator control technicians on Kaua’i suggest a continuing invasion every 3 to 12 months of new individual barn owls, into territories where control efforts are carried out (G Reid 2017, pers. comm.). Feral cat control will consist of regular trapping, along the rim of the Kalalau Valley, an area where cats have been observed on a near-weekly basis (K Pias 2016, pers. comm.). The trapping and shooting of barn owls and feral cats will benefit existing nesting colonies of Covered Seabirds in Kalalau Valley throughout the term of the 30-Year plan duration. The effects of the barn owl and feral cat control in Kalalau Valley on the Covered Seabirds discussed in this section are in addition to the effects of the barn owl and feral cat control around the perimeter of the fence at the Kahuama’a Seabird Preserve on ‘a’o (discussed above).

The breeding phenology and susceptibility of the Covered Seabirds to predation by barn owls and feral cats suggest that barn owl and feral cat control will result in an increase in the reproduction and numbers of seabirds breeding in Kalalau Valley outside of the 2ha Preserve site. According to population distribution models and data collected on seabird occurrence and threats, seabird predation by non-native barn owls and feral cats during the breeding season contributes to limiting the distribution of Covered Seabirds on the island of Kaua’i (Troy et al. 2014, Raine et al. 2017e, USFWS 2017c). The Covered Seabirds are primarily susceptible to predation by barn owls and feral cats during the 6-9 months following breeding periods when
they are present at nesting colonies. The specific period is species dependent: ‘a’o, late March/early April through mid-November (Raine et al. 2017i); ‘ua’u, early April through end December (Raine et al. 2017i); and ‘akē‘akē, late May through mid-October (Raine et al. 2017c).

Immediate actions in Year 1 of the KSHCP to protect occupied breeding habitat of the Covered Seabirds from barn owls and feral cats, will address an important component of the survival and recovery needs of these species within the Kalalau Valley. The control of barn owls and feral cats will enhance adult survivorship and reproductive success of pairs breeding in the affected area (USFWS 2017b).

4.1.2.1 Benefits to the ‘A’o from Barn Owl and Feral Cat Control

The ‘a’o population in Kalalau Valley that will be protected is estimated at 2,700 birds, using statistical methods employed in USFWS (2017a). This meta-population size was projected by USFWS, based on statistical analyses of ‘a’o calling data from auditory surveys conducted by the Kaua’i Endangered Seabird Recovery Project (KESRP). The KESRP calling data was compiled by USFWS in Geographic Information Systems (GIS) that allows mapping of numbers of calls and their locations relative to specific areas on Kaua’i. This information is packaged into separate polygons (i.e., shapes linked to geographic areas). As the data contained in KESRP polygons do not have an estimate of colony size, a statistically rigorous assessment relating calling data to information on environmental variables (e.g., slope, aspect) collected at known seabird breeding burrows was developed to proportion out the ‘a’o population estimate into each polygon, allowing for meta-population estimates (Joyce (2013). The subset of the ‘a’o meta-population within Kalalau Valley that is breeding outside the proposed 2ha fenced site is estimated to include 2,700 individuals.

The benefit of barn owl and feral cat control on ‘a’o reproduction was estimated using a mitigation efficacy calculator (USFWS 2017a) and adjusted based on additional information on adult and chick distributions across the populations projected in the models, provided by the USFWS in May 2017. The effect on reproduction was expressed as a change in the number of fledglings produced by the breeding pairs estimated to breed in Kalalau Valley (outside of the 2ha Preserve site) compared to the existing condition. Implementation of barn owl control is anticipated to provide a reproductive benefit of five ‘a’o fledglings per year and 150 fledglings over the 30-year duration of the KSHCP, based on the following assumptions: 80% decrease in barn owl predation of ‘a’o in the Kalalau Valley; beginning barn owl control in Year 1 of the KSHCP; and otherwise low ‘a’o predation levels within the Kalalau Valley (as defined in Appendix C: Social Attraction Benefit Estimator). These results (as well as the estimated benefit of feral cat control below) rely on the assumption that breeding adults protected by predator control (above the baseline level) will contribute to the anticipated fledglings increase in reproduction annually. Model estimates will be updated as needed with results of monitoring data, as described in Section 12.1.3 of Appendix A: Kahuama’a Seabird Preserve Management Plan.
The effectiveness of barn owl control in the Kalalau Valley will likely be limited by the level of barn owl detection, which is influenced by a frequency of monitoring and control activities. Therefore, the KSHCP estimates assume an 80% reduction in the number of shearwaters predated by barn owls. For example, in 2015 in an area which has received intensive predator control since 2011 (Upper Limahuli), an adult ‘a’o was found predated by a barn owl and at least one barn owl was observed hunting on multiple occasions (Raine et al. 2016b).

Implementation of feral cat control is expected to provide a reproductive benefit of ten ‘a’o fledglings per year and 300 fledglings over the 30-year duration of the Plan. This is based on the following assumptions: 30% decrease feral cat predation of ‘a’o in the Kalalau Valley; beginning feral cat control in Year 1 of the KSHCP; and otherwise low ‘a’o predation levels within the Kalalau Valley (as defined in Appendix C: Social Attraction Benefit Estimator). This predation level is described in USFWS (2017a), and is consistent with modeling for the social attraction project (discussed above).

The spatial coverage of feral cat trapping will likely limit effectiveness of the feral cat control in the Kalalau Valley. Under the KSHCP, the feral cat control will suppress the ingress of feral cats via the rim of the valley (a known movement corridor of feral cats) into ‘a’o breeding sites. The control is not expected to stem the influx of feral cats from the valley floor, where feral cats occur in high numbers (Pias 2016, pers. comm.). Further surveys are needed to evaluate the movement patterns of cats in the valley to determine the extent of primary cat corridors up valley walls to breeding sites. At nearby ‘a’o nesting colonies within Honō o Nā Pali Natural Area Reserve (NAR), at least 11 ‘a’o (8 adults and 3 chicks) were predated by feral cats over the two year period, 2014-2015. During this same time cat control was ongoing in montane areas within the NAR (Raine and Banfield 2015a, Raine and Banfield 2015b, c, Raine et al. 2016a, Raine et al. 2016d, Raine et al. 2016e). Based on the above and the locations of ‘a’o breeding colonies within the Kalalau Valley (Section 5.4, Figure 5-1 and Appendix A: Kahuama’a Seabird Preserve Management Plan), efficacy estimates are conservative and assume that trapping along the rim of Kalalau Valley will achieve a 30% reduction in the number of shearwaters predated by feral cats.

In addition, the estimated ‘a’o reproductive benefit of predator control was based on the 2018 projected ‘a’o population size. This estimate did not take into account the changes to the population in the valley throughout the Plan term from 1) ongoing impacts of remaining predation (rats, cats, pigs and barn owls) or 2) beneficial effects of establishing a breeding colony of ‘a’o within the fully protected, terrestrial predator-free, fenced social attraction site (Section 4.1.1).

4.1.2.2 Benefits to the ‘Ua‘u and ‘Akē‘akē from Barn Owl and Feral Cat Control

Due to the low amount of ‘ua‘u and ‘akē‘akē take anticipated to be covered under the KSHCP (described in Section 4.2.1), no modeling of these species populations was conducted to estimate the potential increase in their reproduction due to mitigation measures, inclusive of
barn owl and feral cat control. However, these species are expected to experience some benefits from these mitigation measures.

One of the largest ‘ua’u populations outside of the Haleakalā colony on the island of Maui breeds in Kaua‘i at Hono o Nā Pali NAR, adjacent to Kalalau Valley. In Hono o Nā Pali NAR, a minimum of 240 burrows were documented across several colonies, including the Pihea, Pohakea, and North Bog colonies (Raine et al. 2017h, f, g). The ‘ua’u population breeding in native-dominated forest on the southwestern rim of Kalalau Valley is likely an extension of the Pihea colony.

Song meters and auditory surveys have been used to monitor the populations in this area because the terrain is often too steep to allow safe searching for burrows (Raine et al. 2017h). The same song meters monitored populations of both ‘a’o and ‘ua’u in this area, on 450 total nights and 501 total hours (Raine et al. 2017h). The song meters in this study were programmed to record 1 out of every 5 minutes, for 5 hours starting at sunset, then record 1 out of every 10 minutes for the 5 hours preceding sunrise.

In 2015, the highest number of calls detected by these song meters in the Kalalau rim area equaled approximately six ‘a’o calls per minute (6.37 +/- 6.56 calls/minute +/- sd) and five ‘ua’u calls per minute (4.77 +/- 4.24 calls/minute +/-sd) (Raine et al. 2016a). These sites were also surveyed in 2013 and 2014, and no significant differences were found between years for all three years of both ‘a’o and ‘ua’u monitoring (Raine et al. 2016a). Barn owls and feral cats regularly predate ‘ua’u at their nesting colonies. For example, the carcasses of adult ‘ua’u depredated by barn owls were found in the Upper Limahuli colony in 2011 (n=2) and in the Pohakea colony in 2013 (n=1) (Raine et al. 2017f). In Hono o Nā Pali NAR over the two year period (2014-2015) at least 36 seabirds were predated by feral cats of which seven carcasses were confirmed to be ‘ua’u (4 adults and 3 chicks), 11 confirmed to be ‘a’o, and the rest (n=18) could not be identified to species (Raine and Banfield 2015a, Raine and Banfield 2015b, c, Raine et al. 2016a, Raine et al. 2016d, Raine et al. 2016e).

Evidence of an ‘akē’akē population in Kalalau Valley is based on detections of ‘akē’akē vocalizations during their breeding season (Wood et al. 2002, Raine et al. 2017c). Additional ground and auditory surveys are needed to estimate the population of ‘akē’akē in Kalalau Valley; however, auditory detections of high rates of calling indicate that ‘akē’akē is likely breeding throughout the valley (Section 5.4, Figure 5-1 and Appendix A: Kahuama’a Seabird Preserve Management Plan). Raine et al. (2017c) reported that ‘akē’akē calling rates in this area, detected during auditory surveys (conducted in 2006-2015), exceed 128 calls per hour. The carcass of a depredated ‘akē’akē found on the Nā Pali Coast and observations of barn owls attracted to broadcast calls of ‘akē’akē during banding sessions (Raine et al. 2017c) suggest barn owls regularly hunt this species. Feral cats are known to occur on the rim above the valley, between Honopū Valley and Kalalau Valley (Banfield et al. 2014), and are likely also preying on ‘akē’akē breeding near the top of walls of Kalalau Valley (where calling has been heard, see Section 5.4, Figure 5-1 and Appendix A: Kahuama’a Seabird Preserve Management Plan).
It is reasonable to assume that the barn owl and feral cat control will provide an annual benefit of at least 2 fledglings and 2 adult or sub-adult ‘ua’u and at least 1 fledgling and 1 adult ‘akē’akē on Kaua‘i. This is based on known breeding activity of ‘ua’u and ‘akē’akē (discussed further below) in the Kalalau Valley, records of predation by barn owls and feral cats of these species in nearby colonies, and the anticipated increase in reproduction and adult survival resulting from barn owl and feral cat control. Over the 30-year term of the KSHCP, this benefit totals 60 fledglings and 60 adults or sub-adults of ‘ua’u as well as 30 fledglings and 30 adults or sub-adults of ‘akē’akē.

4.1.3 Recovery and Release of Downed Seabirds

Reducing mortality of fledglings and adult seabirds that have been grounded (i.e. those that have landed and cannot regain flight from fatigue due to attraction to artificial lights) will contribute toward recovery of the Covered Seabird populations on Kaua‘i. All three of the Covered Seabirds are impacted by light attraction on Kaua‘i, although at different rates based on the Save our Shearwaters (SOS) program recovery data (Reed et al. 1985, Harrison et al. 1990, Cooper and Day 1998, DLNR 2016). The SOS is a nonprofit that collects, treats, and releases all native Hawaiian wildlife as well as grounded birds on Kaua‘i.

Research comparing the survival of SOS-released ‘a’o fledglings to survival of fledglings that naturally disperse out to sea from montane breeding colonies (i.e., naturally-fledged) was carried out over 3 seabird fledging seasons (2014, 2016, and 2017). The research relied on tracking birds using satellite tags and comparing their survival rates over time.

The objective of the 2014 study was to evaluate attachment technique and tagging technology. The study selected only the healthiest SOS birds that were most likely to survive; birds deemed suitable for immediate release (within 1-2 days). The study found that all ‘a’o fledglings in the study travelled to an area 2km southwest of the Hawaiian Islands. The tags transmitted location data for an average of 20-days (min = 11 d, max = 31 d, median = 18.5 d) (Raine et al. 2015, p. 6). All birds ceased to transmit movement activity within 2-weeks, based on an activity sensor in the tag that measures the animal’s head tilt. The 2014 study demonstrated that SOS-released ‘a’o fledglings were able to successfully travel to their pelagic foraging areas, however, the degree to which fitness levels of individuals of the Covered Species are improved by the SOS program after an injury, was unclear.

Therefore, research was conducted again in 2016 and 2017 to compare the survivability of birds beyond 14 days of SOS-released ‘a’o fledglings to the survival of naturally fledged shearwaters. Fourteen days is expected to be the maximum time period in which a hatch-year bird would need to learn how to feed itself or succumb to starvation (Mougin et al. 2000), and is the time period in which we would expect the hatch-year bird to succumb to any unknown injuries from being grounded, if those injuries were present but not observed prior to release (Raine et al. 2017a). The 2016 study included individuals submitted to SOS and deemed healthy (e.g. good release weight, plumage, body condition, and lack of physical injuries) and suitable for immediate release (within 1-2 days). Data from 2016 resulted in 83% of both naturally fledged (from Upper Limahuli) and SOS-retrieved fledglings (n=12) that survived beyond 14-days. The
2017 tagging study used both SOS-birds suitable for immediate release and SOS-birds that had spent up to 14 days in rehabilitation to compare with naturally-fledged birds (Raine et al. 2018). The 2017 study used only the individuals that met SOS standard release requirements2. One-hundred percent of SOS birds suitable for immediate release (n=4); 77% of SOS-rehabilitated birds (n=13); and 100% of a naturally fledged bird (n=1) survived at-sea beyond the two week threshold.

All SOS-released and naturally fledged hatch-year birds in the 2014, 2016, and 2017 studies, successfully traveled to foraging grounds at-sea southwest of the Hawaiian Islands and exhibited normal movement patterns as indicated from tagging data (Raine et al. 2015, Raine et al. 2017a, Raine et al. 2018). The length of time tags transmitted in 2016 and 2017 suggest that the 2014 cohort of tagged birds likely suffered due to weather or climatic conditions affecting food availability (Raine et al. 2016, Raine et al. 2017, p. 21) rather than effects from the tagging.

Additionally, in 2016, an adult ‘ua’u that had collided with a powerline and was recovered and tagged with a satellite transmitter by KESRP and subsequently flew just under 50,000 km to foraging sites, transmitting for 159 days until the tag battery fell off (Raine et al. 2017b). The distance and time traveled by this ‘ua’u suggests that some seabirds discovered and collected under powerlines following a serious injury (collision), and rehabilitated for a period of more than two days, may also experience the same foraging and movement patterns as a seabird that did not collide. However, the Hawaiian petrel, which was a breeding adult, did not return to its burrow that year and thus was a failed breeder. Nonetheless, it is important to note that without recovery and rehabilitation of downed birds, the potential for rehabilitation and survivability would not be possible.

4.2 IMPACT OF TAKING ON THE COVERED SPECIES

4.2.1 TAKE DUE TO ARTIFICIAL LIGHTING

Artificial lights affect the Covered Seabirds by degrading the transitory habitat for movement of fledglings in particular from the breeding colonies to the ocean. Fledgling seabirds may become confused or disoriented and suffer extreme fatigue when attracted to artificial lights. Seabirds affected by light attraction exhibit the following typical sequence of behaviors. Seabirds initially approach light sources from higher altitudes and exhibit a period of rapid flight and circling of lit areas. This is followed by descent and slowing of flight, and ultimately “fallout” by landing on the ground at locations where they normally would not have landed (Reed et al. 1985, Telfer et al. 1987) or colliding during flight with artificial structures such as wires, poles, or buildings (Ainley et al. 2001, Travers et al. 2016). Grounded seabirds can suffer injury, starvation,

2 The SOS standard release requirements include no apparent injuries, good body condition (at least a 2 on a 3-point scale), normal mentation, good flap test, and non-damaged/non-contaminated plumage. Waterproofing also needs to be demonstrated for birds spending time in rehab (Raine et al. 2018). This group does not include birds which SOS consider ‘marginal’ releases (e.g., compromised due to feather condition).
predation, or collision (e.g., with vehicles). Seabirds that collide in flight with artificial structures are commonly injured or killed.

Grounding Covered Seabirds due to light attraction is considered “take” in the form of ‘harm and harass’ under the ESA and State of Hawai‘i laws; however, not all grounded seabirds experience the same level of injury. The KSHCP conservation measure of recovering, evaluating, rehabilitating (if needed), and releasing Covered Seabirds in adequate condition is anticipated to mitigate the injury or harm of the affected individual caused by light attraction when the individual released meets the SOS release standard and is released within 48 hours (2 days) of being grounded (see Section 4.1.3). Therefore, seabirds that receive this treatment are considered “non-lethal” take. Grounded seabirds that are not recovered (i.e., undiscovered seabirds) are considered to have been taken in the form of harm, however, these undiscovered seabirds are anticipated to eventually suffer mortality due to predation, vehicle collision, or starvation and dehydration. Therefore, seabirds that are killed due to collisions or other factors related to a grounding event, and grounded seabirds that are not recovered are referred to hereinafter as “lethal take”.

Covered Seabirds turned into SOS that cannot be rehabilitated and released (e.g. due to severe injury or poor body condition) are euthanized. These seabirds and those that die under rehabilitation are also considered to be taken in the form of harm, and referred to hereinafter as “lethal take”. Of the ‘a’o recovered by SOS in the ten-year period (2006-2016), an 88% average were deemed to be in good condition and released back into the wild (SOS, unpublished data). The remaining average 12% resulted in mortality of downed ‘a’o (i.e. seabirds turned in dead, those that died while in care, and those deemed unfit for release back into the wild (i.e. euthanized)).

This statistic is generalized for all birds turned in to SOS, and does not account for site-specific circumstances at each Applicant’s facility. Each Applicant will review their individual SOS records to make a determination on the anticipated number of seabird injuries or mortalities that will result from their Covered Activities. The methods for KSHCP Applicants to determine the amount of take of Covered Seabirds at their facilities and to account for estimated injuries or mortalities are described in Section 6.2.2, which specifies the requirements for preparing a PIP. Rapid discovery of Covered Seabirds, proper handling, as well as awareness and education of seabird fallout is expected at a Participant facility(s) as part of minimization efforts required under the KSHCP (see Section 5.3). If carried out diligently, rapid discovery will contribute towards lower seabird mortality rates, and thus overall lower levels of lethal take at a Participant facility(s).

The timing of take of fledgling Covered Seabirds is primarily during the period when they leave their natal colony (the fledging period) from September 15 - December 15 each year. Adult Covered Seabirds may also be attracted to lights while transiting to and from their nesting colony, during the species’ specific nesting periods (i.e. ‘a’o, late March/early April through mid-November (Raine et al. 2017h); ‘ua’u, early April to end December (Raine et al. 2017i); and ‘akē’akē, late May through mid-October (Raine et al. 2017c)). Higher levels of seabird fledgling
take are expected during new moon periods than during full moon periods, likely because the moon is one of the visual clues seabirds use for first time navigation to the sea (Telfer et al. 1987).

It is anticipated that the annual take of Covered Seabirds will remain constant over the 30-year duration of the KSHCP and its associated ITPs and ITLs, based on recent trends of SOS recoveries island-wide in Kaua‘i (‘a‘o, years 2011-2015; ‘ua’u, 2000-2015). Over these years, SOS island-wide recoveries of the ‘a‘o and the ‘ua’u have been stable (DLNR 2016), indicating a stable/consistent rate of threats to the current populations. It is important to note this stable annual downed rate of seabird recovery is at the latter half of the total time durations since first documentation of these threats occurred and after a ten year period (1993-2013) when the populations of ‘a‘o and ‘ua’u were estimated to have declined by 94% and 78% respectively (average annual rate of ~13% and 6% respectively) (Raine et al. 2017d). One exception to the steady annual recovery rate during this period was a large fallout event in 2015 at the Kōke‘e Air Force base near ‘a‘o breeding colonies. Significant modifications to the light regime have since been made to minimize fallout threats at the base (USAF 2016). This indicates that even though development on the island of Kaua‘i may have increased lighting levels during these respective periods of time, island-wide, the threat of fallout of ‘a‘o and ‘ua’u have been stable.

Because the KSHCP functions as a plan under which multiple entities may apply for incidental take authorization, it cannot be known exactly how much take will be covered under the KSHCP until potential permit recipients submit take requests and receive permits from the regulatory agencies. Therefore, estimates summarized in this section are considered the maximum take amounts that could be permitted under the KSHCP. An amendment to the KSHCP would be necessary if take requests exceed these maximum take amounts (see Section 6.13.1 and 6.13.2 on minor and major amendments). Individual take requests of entities participating in the KSHCP will be presented in PIPs and not described in this section.

4.2.1.1 Direct Take of Fledglings, Adults, and Sub-adults
The amount of take anticipated under the Plan, including annual and 30-year take amounts, is based on analyses of available data provided by DOFAW, USFWS, and prospective Applicants for an ITP and ITL under the KSHCP. During the development of the KSHCP, prospective Applicants were identified, contacted and encouraged to join the KSHCP. DOFAW provided pre-application technical assistance to interested parties using data analyses of SOS recovery records of the Covered Seabirds.

The annual take amounts under the KSHCP are totals of specific estimates derived using methodologies to estimate Applicant take as described in Section 6.2.2. The five-year average (2011-2015) of SOS recoveries at an Applicant’s facility(s) was used to estimate take amounts for ‘a‘o for individual Applicants. A 15-year period (2000-2015) of SOS recoveries was used to estimate take of the ‘ua’u and ‘akē’akē for individual Applicants because fallout of these species is a much rarer occurrence. Considerably fewer ‘ua’u, and even less ‘akē’akē, are grounded by light attraction according to recent SOS program recovery records (DLNR 2016). Of the total
SOS recoveries of the Covered Seabirds in the years 2011 to 2015 (n=853, including fledglings, adults, and sub-adults), 5% were ‘ua’u (n=43) and 0.6% were ‘akē’akē (n=5).

The majority of the light attraction take on the island of Kaua‘i involves fledgling seabirds. Adults and sub-adults are occasionally found in association with bright lights, usually near breeding colonies (e.g. northern region of the island of Kaua‘i). The percentage of adult ‘ua’u and ‘akē’akē (~20%) of the total for each species, is higher than ‘a’o (~5%) in island-wide SOS recoveries of the Covered Seabirds. Less is known of the likelihood of adult take of petrels occurring at prospective Applicant facilities.

The background information described above on island-wide SOS recoveries, pertaining to the species composition, the percentage of seabirds deemed to be in good condition and released, and the likelihood of adult take per species, is not necessarily reflective of the fallout records of prospective Applicants. However, fallout of the prospective Applicants is expected to be stable, consistent with the recent, island-wide fallout trend. Table 4-1 describes the take anticipated under the KSHCP, including lighting impacts to Covered Seabirds resulting in mortality (lethal take) and impacts resulting in injury or harm with subsequent recovery, evaluation, rehabilitation (if needed) and release to sea (non-lethal take). In addition, take estimates assume implementation of ongoing lighting modifications (see Section 5.3) which may reduce impacts to seabirds, but do not completely eliminate lighting threats.

4.2.1.2 Indirect Take of Dependent Eggs or Chicks
The numbers of Covered Seabird chicks or eggs that are likely to be killed as a result of its parent’s death) due to light attraction were estimated (Table 4-1) using information on population demographics. Based on this information, up to two ‘a’o chicks or eggs (1.75 rounded to 2) are likely to be killed over the 30-year KSHCP duration. This assumes 70% of adults killed due to light attraction would have been breeding and 50% of breeding attempts would have resulted in a chick fledging the nest (i.e. breeding probability of 70% and reproductive success of 50%) (Griesemer and Holmes 2011). Also, based on this information, up to 10 ‘ua’u chicks or eggs (9.6 rounded) are likely to be killed over the 30-year term of the KSHCP, assuming a breeding probability of 89% (Simons 1984) and reproductive success of 72% (Simons 1985).

No data exists on the population demographics of ‘akē’akē in the Hawaiian Archipelago. However, breeding probability and reproductive success of adult pairs in the European storm-petrel (*Hydrobates pelagicus*), a similar sized small seabird (Dunning 2008) in the same family (*Hydrobatidae*; order *Procellariiformes*) as the ‘akē’akē, was estimated at 69% (Hemery et al. 1986 in Mougin et al. (1997)) and 53% to 63%. This range is from four studies, 1980 to 2001, in Cadiou (2001) and consistent with Sanz-Aguilar et al. (2008). Based on these data from an analogous species, three ‘akē’akē chicks or eggs are likely to be killed over the 30-year Plan duration, assuming 69% breeding probability and 58% reproductive success (mid-point of above range).
An injury of a parent Covered Seabird and its subsequent rehabilitation and release of an adult (its survival) may disrupt incubation or provisioning patterns, and result in the loss of a chick or egg. Both ‘a’o and ‘ua’u parents take turns incubating the egg and provisioning the chick. Therefore, the number of Covered Seabird chicks or eggs that are likely to be killed as a result of this disruption of adult care was estimated using the population demographic information explained in the previous paragraph (Table 4-1).

Table 4-1. Maximum anticipated take amounts for the ‘a’o, ‘ua’u, and ‘akē’akē under the KSHCP.

<table>
<thead>
<tr>
<th></th>
<th>Total Annual</th>
<th>Total 30-year</th>
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<tr>
<td></td>
<td>Mortality</td>
<td>Injury</td>
</tr>
<tr>
<td></td>
<td>(Lethal)</td>
<td>(Non-lethal)</td>
</tr>
<tr>
<td>‘a’o</td>
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<td></td>
</tr>
<tr>
<td>Fledglings</td>
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<td>45</td>
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<td>Adults or sub-adults</td>
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<td>0.33</td>
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<td>&lt;0.1</td>
</tr>
<tr>
<td>‘ua’u</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fledglings, adults, or sub-adults</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Eggs/chicks</td>
<td>0.33</td>
<td>0.33</td>
</tr>
<tr>
<td>‘akē’akē</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fledglings, adults or sub-adults</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Eggs/chicks</td>
<td>0.1</td>
<td>0.1</td>
</tr>
</tbody>
</table>

4.2.2 Take Impacts in Relation to Covered Seabird Population Size and Reproduction

To provide perspective on the impact to the affected Covered Seabirds’ adult population and reproduction, the estimated take is expressed as a proportion of the adult population size and the number of fledglings produced annually for the Covered Seabirds’ Kaua’i populations. This value was calculated using the reproductive rates described in Section 4.1 and population estimates in Appendix C: Social Attraction Benefit Estimator.

In the Kaua’i population of ‘a’o, the annual mortality of 30 fledglings and less than 0.1 eggs or chicks (Table 4-1) represents 1.44% of the total fledglings produced or 2,086 fledglings. This assumes 63.7% of the population is adults, the reproductive rates are as described above, and a Year 1 population of 18,720 birds (Appendix C: Social Attraction Benefit Estimator, Table 3; 80% of this population in flight path estimates equals 14,976 birds). The mortality of 0.33 adult ‘a’o per year represents less than 0.01% of the total estimated Kaua’i adult population (11,925 adults).

The ‘ua’u population residing on the island of Kaua’i is estimated at 1,200 to 1,600 pairs (Ainley et al. 1997a, Pyle and Pyle 2009). At this level, the mortality of one adult per year due to light
attraction would represent up to 0.03% to 0.04% of the Kaua‘i adult ‘ua‘u. In comparison, the mortality of one fledgling and 0.33 eggs or chicks of the ‘ua‘u per year equals 0.13% to 0.17% of the total fledglings produced on Kaua‘i (an estimated population of 769 - 1,025 fledglings given the Kaua‘i breeding adult population range and reproductive rates as described above).

Based on the estimated Kaua‘i population of ‘akē‘akē of 171-221 breeding pairs, (Wood et al. 2002) and reproductive data of European storm petrel discussed above, the mortality of 0.5 fledglings and 0.1 eggs or chicks of the ‘akē‘akē per year represents 0.68% to 0.88% of the estimated total fledglings produced annually by this species (68 – 88 fledglings). Comparatively, the mortality of 0.5 adult ‘akē‘akē per year equals 0.11% to 0.15% of the Kaua‘i adult population of this species.

4.2.3 Proportion of Island-wide Light Attraction Effects Covered under KSHCP
The total amount of take potentially covered under the KSHCP will be less than the total island-wide light attraction effects to the Covered Seabirds. Approximately 50% of the total downed birds recovered by SOS are not attributable to any specific, consistent, or known source of light attraction. For this portion of light attraction impact, there is no identifiable entity to apply for take authorization. Additionally, there are several entities with identified ongoing take that will be mitigated through other means (e.g., federal entities, KIUC, etc.). Finally, not all of the identified, eligible entities expressed interest in participating in the KSHCP.

Of the total island-wide light attraction fallout of the Covered Seabirds, the following is expected to be covered and mitigated for directly by the KSHCP (Table 4-2): about 23.5% of ‘a‘o take, 11.6% of ‘ua‘u take, and 50% of ‘akē‘akē take. Annual island-wide take estimates (rounded to whole numbers), denoted by the asterisk (*) in Table 4-2, are calculated from average SOS recoveries (2011–2015) with a 50% searcher efficiency rate to account for grounded birds present but not found (Ainley et al. 1995). Estimates of island-wide take and total amount addressed under the KSHCP do not include indirect effects to chicks or eggs.

Table 4-2. Proportion of island-wide light attraction take impacts covered under the KSHCP.

<table>
<thead>
<tr>
<th></th>
<th>Annual</th>
<th>30-year</th>
<th></th>
<th>Annual</th>
<th>30-year</th>
<th></th>
<th>Annual</th>
<th>30-year</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘A‘o</td>
<td></td>
<td></td>
<td>‘Ua‘u</td>
<td></td>
<td></td>
<td>‘Akē‘akē</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total island-wide take estimate</td>
<td>322*</td>
<td>9,660</td>
<td>Total island-wide take estimate</td>
<td>17*</td>
<td>516</td>
<td>Total island-wide take estimate</td>
<td>2*</td>
<td>60</td>
</tr>
<tr>
<td>Total amount addressed under KSHCP</td>
<td>75.66</td>
<td>2,270</td>
<td>Total amount addressed under KSHCP</td>
<td>2</td>
<td>60</td>
<td>Total amount addressed under KSHCP</td>
<td>1</td>
<td>30</td>
</tr>
<tr>
<td>Proportion addressed</td>
<td>23.5%</td>
<td></td>
<td>Proportion addressed</td>
<td>11.6%</td>
<td></td>
<td>Proportion addressed</td>
<td>50%</td>
<td></td>
</tr>
</tbody>
</table>

Draft Kauai Seabird Habitat Conservation Plan
4.2.4 Timing of KSHCP - Impact of Delay in Mitigation Benefits in Relation to Take Impacts

As discussed in Section 4.1.3 above, under the KSHCP, light attraction-related take of fledgling, sub-adult, or adult Covered Seabirds resulting in injury (but not mortality), is likely to be offset in the same year (i.e., in-year) by mitigation consisting of recovery, evaluation, rehabilitation (if necessary), and release to sea of downed seabirds. Seabird recovery and rehabilitation services will be provided throughout the duration of the Plan, either through the SOS program, or another rehabilitation provider (see Chapter 7 - Funding).

Barn owl control and feral cat control in the Kalalau Valley to be implemented under the KSHCP is anticipated to provide a complete, possibly greater than in-year offset of the total anticipated lethal take of ‘ua’u and ‘akē’akē proposed under the KSHCP (Section 4.1.3). Therefore, no delay in accruing reproductive benefits for these species is anticipated. However, given the estimated level of take of the ‘a’o as a result of light attraction and the delay in accruing benefits to ‘a’o reproduction from the seabird social attraction project, only a partial in-year offset of ‘a’o take is anticipated in the first 12 years of the KSHCP implementation.

‘A’o reproductive benefits (i.e., via an increase in fledgling production) being provided by the seabird social attraction project are expected to be delayed due to a combination of factors. These primarily include: (1) the conservative estimate of the starting population within the fenced 2-ha site (zero); (2) the several years to recruit breeding adults and increase breeding adult numbers at the social attraction site; and (3) the time delay to breeding age (6 years old) of fledgling birds that return to breed at the site. This is not the case for anticipated reproductive benefits from barn owl and feral cat control in the Kalalau Valley, for which the increase in ‘a’o reproduction (15 fledglings) begins in the first year of the KSHCP.

Under the KSHCP, the standard for mitigating take of the ‘a’o resulting in mortality will be as follows: increasing ‘a’o reproduction by one fledgling will be necessary to offset each fledgling or egg/chick mortality, and by 3 fledglings to offset the mortality of one adult, given an juvenile/sub-adult survivorship of 0.33 (Ainley et al. 2001). One out of the 15 ‘a’o fledglings produced annually as a result of barn owl and feral cat control provides for a complete in-year offset for the adult ‘a’o mortalities anticipated to be covered under the KSHCP (1 adult every 3 years or 0.33 annually). This means the reproductive benefits of the seabird social attraction project increases each year beginning in year 4 (Appendix C: Social Attraction Benefit Estimator). When these benefits are added to the remaining benefits of the barn owl and feral cat control (14 fledglings annually), there is a partial in-year offset of fledgling mortalities in Years 1 to 12 of the KSHCP, a complete in-year offset in Year 13, followed by a greater than in-year offset in Years 14-30 (Figure 4-1).
The delay in achieving mitigation benefits for the ‘a’o as a result of the seabird social attraction project (Appendix C: Social Attraction Benefit Estimator) and the partial in-year offset of ‘a’o fledgling take in Years 1 to 12 results in a loss of ‘a’o productivity over the term of the KSHCP. Because of the delay, the Kaua’i ‘a’o population is likely to experience a loss in breeding productivity due to the mortality of fledglings that would have returned to breed as adults and the loss of productivity of their progeny and subsequent progeny. The number of ‘a’o fledglings subject to take impacts that are not mitigated for in the same year as the take impact is shown in Figure 4-1, including 16 fledglings in Year 1, with a decreasing, in-year mitigation deficit from Years 4 until Year 12.

The loss in ‘a’o reproduction represented by these impacts that are not mitigated in-year, represents progeny that would have survived to breeding as well as the loss in reproduction of their progeny and subsequent progeny. These effects were calculated for each year of the 30-year KSHCP, based on an ‘a’o juvenile to adult survival of 0.28, breeding probability of 70%, and reproductive success of 50% (Appendix C: Social Attraction Benefit Estimator; Griesemer and Holmes (2011) low predation). The number of ‘a’o fledglings that the surviving breeding adults, their progeny, would have produced is equal to 81 fledglings over 30 years.

![Figure 4-1. Annual take of fledgling ‘a’o and annual increase in ‘a’o fledglings (i.e. annual mitigation gain) likely to result from KSHCP conservation program*](image)

*Note: An annual increase of one out of the 15 fledgling ‘a’o is not included in the annual mitigation gain, because the one ‘a’o fledgling is anticipated to mitigate the proposed annual adult take of 0.33.
4.3 NET EFFECTS OF ANTICIPATED TAKE IMPACTS AND THE KSHCP CONSERVATION PROGRAM

Over the 30-year term of the KSHCP, the seabird social attraction project, the barn owl control, and feral cat control are likely to result in a positive ‘a’o reproduction output trajectory relative to the fledgling take impacts covered by the KSHCP. Due to the expected delay in productivity at the social attraction site, the Kaua‘i ‘a’o population is likely to decrease by ~25 breeding adults (0.21% of the Kaua‘i adult population in 2018?) by Year 16 of the KSHCP. However, in Year 27 of the KSHCP, the cumulative ‘a’o fledglings produced by the conservation program (fledglings produced at the social attraction site plus by nesting ‘a’o in areas subject to barn owl and feral cat control) is likely to exceed the total fledgling take and total loss of productivity in fledglings from the delay in mitigation (980.7) (Figure 4-2).

From Year 27 through Year 30, the KSHCP conservation program is likely to provide a net benefit to the ‘a’o population of 136 fledglings (Figure 4-2). Note: if the requested take amount by KSHCP Participants is below the maximum level of take anticipated under the KSHCP (see Table 4-2), the conservation program would likely offset the take impacts more quickly than Year 27. Subtracting the 2 fledglings required to offset the chick/egg loss from mortality of 10 adult ‘a’o over the 30-year term of the KSHCP results in a total net benefit of 134 fledglings. The resulting ‘a’o fledgling mitigation replacement ratio (fledgling mortalities: fledglings produced) therefore would be 1:1.14 at the end of the plan term.

A complete in-year offset of adult ‘a’o lethal take impacts covered under the KSHCP (an average of 1 adult every 3 years) is likely to be provided annually by the barn owl control and feral cat control along the rim of Kalalau Valley.

The net effect of the KSHCP is therefore predicted to be a positive impact on the range-wide population of the ‘a’o by more than offsetting the adverse take impacts covered under the KSHCP. The overall effects of the take and the conservation program on the ‘a’o population would result in a total net benefit of 134 fledglings. In Year 30, a population of ~372 shearwaters, growing at a rate of 8% per year (lambda of 1.08), would reside within the protected fence site; this represents ~6% of the projected total Kaua‘i ‘a’o population at Year 30 (6,200 individuals; Appendix C: Social Attraction Benefit Estimator). While the annual level of ‘a’o take under the KSHCP represents 1.44% of the anticipated total fledgling production and less than 0.01% of the Kaua‘i adult population (Section 4.2.1), the conservation program would result in protection of ~6% of the Kaua‘i population by year 30. This equals ~5.4% of the range-wide ‘a’o population (6,888 individuals; 90% of ‘a’o breed on Kaua‘i (Ainley et al. 2001).

The barn owl and feral cat control in Kalalau Valley is also predicted to have a positive impact on the range-wide population of the ‘ua’u and ‘akē’akē. Beginning in the first year of the KSHCP, the fledglings, adults or sub-adults, and eggs/chicks produced will exceed the annual take of one ‘ua’u and 0.5 ‘akē’akē. Thirty years of barn owl and feral cat control is likely to provide a total net benefit to the Kaua‘i ‘ua’u population of up to 80 individuals (Figure 4-3). This control will also provide, over the 30 years, a total net benefit to the Kaua‘i ‘akē’akē of up to 42 individuals (Figure 4-3). Although the magnitude of the range-wide beneficial effect of
KSHCP mitigation on the ‘ua’u and the ‘akē’akē is small, it is nevertheless positive and commensurate with the impact of the KSHCP on these species.

![Graph showing cumulative fledglings produced](image)

**Figure 4-2.** Cumulative ‘a‘o fledglings produced, in relation to the total fledgling production required to offset the total impact of the taking of the fledglings (including loss in productivity) in the KSHCP.

![Bar chart showing population](image)

**Figure 4-3.** Total net benefit of 30 years of barn owl and feral cat control expressed in the number of individuals added to the Kaua‘i ‘ua’u population and Kaua‘i ‘akē’akē population.
5. KSHCP CONSERVATION PROGRAM

This chapter identifies the KHSCP conservation goals and objectives and outlines the:

- Avoidance and minimization measures to reduce take of the Covered Species
- Conservation measures to mitigate for the unavoidable effects of authorized take of the Covered Seabirds

5.1 BIOLOGICAL GOALS

Section 10(a)(2)(AB) of the ESA requires that an HCP Participant specify the measures that the will be implemented to minimize and mitigate, to the maximum extent practicable, the impacts of the taking of any Federally listed animal species as a result of activities addressed by the plan.

As part of the “Five Point” Policy adopted by the USFWS and NMFS in 2000, HCPs must establish biological goals and objectives (65 Federal Register 35242, June 1, 2000). The purpose of the biological goals is to ensure that the operating conservation program in the HCP is consistent with the conservation and recovery goals established for the species. These goals are developed based on the species’ biology, threats to the species, the potential effects of the Covered Activities and the scope of the HCP.

The biological goals described below serve as the foundation for the conservation measures that will be undertaken as part of the KSHCP.

Goal 1: Under the KSHCP, avoid and minimize take impacts to the Covered Seabirds caused by nighttime lighting on Kaua‘i to the maximum extent practicable for the 30-year term of the KSHCP. The effects of nighttime lighting on the Covered Seabirds represent a major threat to their survival and recovery.

Goal 2: Under the KSHCP, mitigate authorized take impacts of the Covered Seabirds by enhancing, protecting and managing suitable seabird breeding habitat on Kaua‘i to facilitate successful fledgling production at a level that over the 30-year Plan term offsets or exceeds the take impacts caused by Covered Activities on the production of fledglings in the wild.

5.2 BIOLOGICAL OBJECTIVES

The biological objectives defined below are intended to provide specific and measurable targets for achieving the KSHCP goals. The regulatory requirements to minimize and mitigate the impacts of the taking of the Covered Species form the foundation for the goals and objectives described in Table 5-1. This table lists all goals and objectives relevant to the KSHCP; however, not all objectives are relevant to all Participants. The explicit responsibilities that each Participant must uphold in order to meet the objectives of the KSHCP are described in detail in the individual Participant Inclusion Plans (PIPs) (see Appendix D: PIP Template).
It is important to note that since ‘a’o take impacts comprise the majority of the take anticipated to be covered under the KSHCP, mitigation strategies under the KSHCP are primarily geared towards increasing productivity for this species. The minimization measures and conservation actions of the KSHCP will also serve to minimize the impacts on and offset requested take for the ‘ua’u and the ‘akē’akē.

Each PIP submitted in support of an ITL/ITP application must define the specific combination of minimization strategies to be implemented by the individual Participant (permittee) at their respective facility. The PIP must also define the level of funding that the Participant will provide to support implementation of KSHCP conservation measures to mitigate for the effects of their unavoidable take of the Covered Species. The proposed minimization plan should consider the needs and uses of lights, any regulations pertaining to the uses of lights, and the guidelines defined in Section 5.3 (Avoidance and Minimization) below.

Under the KSHCP, conservation measures will be implemented to mitigate the impacts of authorized take on the Covered Seabirds by all Participants in the Plan. While the KSHCP conservation measures follow the goals and objectives of approved recovery plans for the Covered Species, the actions are not, in and of themselves, intended to achieve recovery of the Covered Species. State of Hawai‘i law (HRS Ch. 195D) requires that mitigation provide a net benefit to the Covered Species and the HCP shall “increase the likelihood that the species will survive and recover.”

Federal law requires that in order for an ITP to be issued, the taking will be minimized and mitigated to the maximum extent practicable and will not appreciably reduce the likelihood of survival and recovery of the listed species in the wild (16 USC 1539). In that regard, a combination of applicable minimization and mitigation measures in a PIP should be applied that are likely to avoid and/or minimize the impacts of the taking and mitigate unavoidable take impacts commensurate with the impact on the Covered Species. That determination will be made on an individual PIP basis according to the requirements for issuance of an ITP under Section 10(a)(2)(B) of the ESA.

Development of the conservation objectives (Table 5-1) for the KSHCP relied on various USFWS and DLNR recovery and management planning documents, including:

- USFWS Newell’s Shearwater Landscape Strategy (USFWS 2017c);
- USFWS Appendix II. Modelling Methods and Results used to Inform the Newell’s Shearwater Landscape Strategy (USFWS 2017a);
- Newell’s Shearwater and Hawaiian Petrel Recovery: Five-year Action Plan (Holmes et al. 2015);
- Newell’s Shearwater Population Modeling for HCP and Recovery Planning (Griesemer and Holmes 2011);
- USFWS Seabird Conservation Plan – Pacific Region (USFWS 2005);
- DLNR Hawai‘i’s Comprehensive Wildlife Conservation Strategy (Mitchell et al. 2005); and

An emphasis was placed on considering most current available scientific information in developing the conservation objectives of the KSHCP relative to Covered Seabirds. Much of the current data (including the results of colony-based conservation and monitoring work) has been gathered by KESRP funded under the KIUC Short-term Seabird HCP (Raine et al. 2017h, f, i, g). Funding has also been provided by the National Fish and Wildlife Foundation (NFWF), St. Regis, and the State Wildlife Grant (SWG) program.

Table 5-1 lists the biological goals and objectives of the KSHCP. These are key to the KSHCP conservation framework. Objectives will be met annually if a year is not specified. Additional tables in subsequent sections and in Appendix A: Kahuama’a Seabird Preserve Management Plan detail how these objectives will be achieved and monitored, and how mitigation credit will be determined for each objective. Objectives 1.E and 2.I address honu; all other honu objectives are detailed in in Chapter 9.

Table 5-1. Biological goals and objectives of the KSHCP.

<table>
<thead>
<tr>
<th>Biological Goals</th>
<th>Biological Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goal 1: Under the KSHCP, avoid and minimize take impacts to the Covered Species caused by nighttime lighting on Kaua‘i to the maximum extent practicable for the 30-year term of the KSHCP. The effects of nighttime lighting on the Covered Species represent a major threat to their survival and recovery.</td>
<td>1.A. Avoid and minimize the impacts of the taking of Covered Seabirds due to light attraction by removing or turning off lighting, and altering light structure and function by the end of Year 1, as specified in PIPs.</td>
</tr>
<tr>
<td></td>
<td>1.B. Minimize mortality of Covered Seabirds downed due to light attraction by implementing actions to reduce presence of free-roaming seabird predators such as cats and dogs at Participant facilities, as specified in PIPs.</td>
</tr>
<tr>
<td></td>
<td>1.C. Minimize mortality of Covered Seabirds downed due to light attraction by conducting annual Worker Seabird Awareness and Response Training (WSART), as specified in PIPs.</td>
</tr>
<tr>
<td></td>
<td>1.D. Minimize mortality of Covered Seabirds downed due to light attraction by implementing seabird awareness outreach to the public, guests, and customers at Participant facilities as specified in PIPs.</td>
</tr>
<tr>
<td></td>
<td>1.E. Avoid and minimize honu hatchling disorientation due to lighting at beachfront facilities by implementing best lighting practices as specified in PIPs, and protecting any nests at facilities via shielding as needed</td>
</tr>
<tr>
<td></td>
<td>1.F. Implement recovery and release of Covered Seabirds downed due to light attraction through the Save Our Shearwaters (SOS) program or other certified rehabilitation facility.</td>
</tr>
</tbody>
</table>
Goal 2: Under the KSHCP, mitigate authorized take impacts to the Covered Seabirds by enhancing, protecting and managing suitable seabird breeding habitat on Kaua‘i to facilitate successful production of fledglings at a level that over the 30-year term of the Plan offsets or exceeds the impacts of light attraction take caused by Covered Activities on the production of fledglings in the wild.

| 2.A. | Construct a predator-proof fence and install social attraction equipment (nest boxes, speakers) within the fenced area at the mitigation site in Year 1 of KSHCP implementation. |
| 2.B. | Remove predators from within the fenced enclosure with monitoring confirmation of their absence, and activation of the social attraction equipment by Year 2; predator eradication within fenced enclosure maintained for the life of the project. |
| 2.C. | Ground activity by Covered Seabirds documented at the mitigation site by Year 4 of KSHCP implementation. |
| 2.D. | Breeding activity by Covered Seabirds documented at the mitigation site by Years 5-7 of KSHCP implementation. |
| 2.E. | Cumulative upward trend in Covered Seabird breeding documented at the mitigation site by Year 10 of KSHCP implementation. |
| 2.F. | Continued cumulative upward trend in Covered Seabird breeding documented at the mitigation site by Year 20 of KSHCP implementation. |
| 2.G. | Maintain high quality seabird habitat at the mitigation site by removal of habitat modifying invasive plants in Year 1 and annually throughout the 30-year duration of the KSHCP. |
| 2.H | Protect nesting birds inside mitigation fence and in nearby source colonies by implementing predator control of 1) barn owls within the area surrounding the fenced enclosure and the Kalalau Valley, and 2) feral cats at ingress points to source colonies in the Kalalau Valley, beginning in year 1 and annually throughout the 30-year duration of the KSHCP. |
| 2.I. | Annual protection of any honu nests adjacent to facilities via shielding or other measures to avoid light attraction take. |

5.3 MEASURES TO AVOID AND MINIMIZE TAKE IMPACTS (BIOLOGICAL GOAL 1)

Measures to avoid and minimize the impacts of light attraction on the Covered Species are an integral part of the KSHCP. Avoidance measures and minimization measures aim to reduce the potential for take of a Covered Species. The avoidance and minimization efforts outlined below, and detailed in Appendix E: Guidelines for Adjusting Lighting at Facilities reflect the best available science on seabird friendly lighting.

5.3.1 ADJUSTING LIGHTING AT FACILITIES

Appendix E: Guidelines for Adjusting Lighting at Facilities includes the following measures to avoid and minimize take impacts to Covered Seabirds:
- Deactivate non-essential lights
- Install full cut-off light fixtures
- Shield light fixtures
- Angle lights downward
- Place lights under eaves
- Shift lighting according to moon phase (during the fall-out period)
- Install motion sensors for motion-activated lighting
- Decrease lighting levels
- Decrease visibility of interior lights
- Use light-less technologies
- Plant vegetation around lights to reduce light visibility
- Lower height of lights
- Use longer light wavelengths

These guidelines are intended to be used in individual PIPs submitted to the USFWS and DLNR as part of the application process. Under the KSHCP, all minimization measures must be implemented within Year 1 of an ITP/ITL and maintained throughout the life of the permit/license. Compliance with the avoidance and minimization measures in PIPs will be monitored and reported at the onset of the KHSCP, and annually thereafter (see Section 6.8.1). New facilities or expansion of existing facilities identified in PIPs shall use, as appropriate, the avoidance and minimization measures described in this section.

The installation of “new” lights (those that are proposed or planned but do not exist at the time of the application for take permit/license) has the potential to exacerbate existing adverse light attraction impacts on Covered Seabirds and cause fallout (i.e. take) of seabirds. Participants in the KSHCP shall consult with the USFWS and the DLNR in advance on their plans to install new lights at existing facilities or to construct new facilities to determine the required avoidance and minimization measures. Depending on their potential impact, installation of new lights at an existing Participant’s facility may require an amendment to a PIP and the permit that has been issued to a Participant.

5.3.2 REDUCING PREDATORS AT FACILITIES (OBJECTIVE 1.B)
Where minimization measures are not likely to result in the avoidance of seabird take, minimizing mortality of downed seabirds is critical. Seabirds that are downed at Participant facilities are vulnerable to direct mortality from predation by free-roaming dogs, cats, rats, and other predators. Downed seabirds that subsequently become predated are considered lethal take (see Section 4.2.1). In order to receive incidental take authorization from the USFWS and DLNR, Participants are required to reduce the presence of predators at their facilities.

The following measures are required, to reduce the potential for Covered Seabird predation at Participant facilities:
1) Prohibit loose, free-roaming cats and dogs (e.g. leash and/or restrain). This prohibition will be clearly communicated with appropriate signage; and
2) Conduct a trapping and removal program at the facility for feral cats and dogs; feral animals should be taken to the Humane Society and not returned to the facility even if neutered.

Minimization measures will be described in individual PIPs submitted to the USFWS and DLNR as part of the application process. All measures to reduce presence of predators must be implemented within Year 1 of an ITP/ITL, and as needed throughout the life of the permit/license, if predators are present at Participant facilities (see Section 6.8.3 and requirement to record predator presence).

5.3.3 Conducting Seabird Awareness Training and Outreach (Objectives 1.C & 1.D)
An important step in reducing mortality of downed seabirds is quickly finding and recovering (i.e. capturing and turning birds in to the SOS facility for rehabilitation) them efficiently. This is most likely to occur when on-site staff and workers are properly able to identify Covered Seabirds, understand and fully implement the protocol for their detection and safe capture, and have a clear search strategy.

Under approved PIPs, each Participant is required to conduct annual outreach and training for workers at their facilities that is specific to Covered Seabirds, beginning in Year 1 of the KSHCP. A detailed slideshow presentation was developed on this subject will be provided by the Prime Contractor staff on request; handouts are also provided in this document under Appendix F: Training and Outreach Materials. Other presentations or programs could be developed to meet this objective, subject to approval by the Prime Contractor. The goal is to properly train workers who will be responsible for the monitoring of downed seabirds at facilities, and who may find a downed seabird incidentally while performing other duties.

Each Participant will also produce seabird outreach materials tailored to their customers, guests, or the public who may be present at their facilities during the seabird fallout season. These materials will supplement efforts of Participant staff members by encouraging more “eyes on the ground” to identify and recover downed seabirds. Outreach at facilities can also help increase general awareness of endangered species issues on Kaua‘i.

Outreach materials may include, but are not limited to:
- Making guests/residents aware of the requirement to close blinds/curtains during seabird fallout season to reduce light attraction caused by interior lights;
- Seabird identification information;
- Location of nearest SOS aid stations;
- Instructions for handling seabirds and notifying appropriate staff; and
- Coloring books, children’s activity books, cartoon depictions, or other means of educating young age groups.
5.3.4 RECOVERY AND RELEASE OF DOWNED SEABIRDS (OBJECTIVE 1.E)

5.3.4.1 Recovery of Downed Seabirds
To adequately achieve Objective 1.E, all Participants are required to strive to recover all downed birds at their facilities and to notify the SOS program and the wildlife agencies as soon as possible as to the location, time and condition of all Covered Seabirds found and recovered. This objective requires that PIPs include a formal, organized search strategy to find downed seabirds. Participant Monitoring Plans, included in PIPs are required to include details on the search strategy, including a map of search routes (which should vary), the frequency of searches, likely problem locations and how these locations will be searched, the personnel involved, time required to complete the searches, date(s) on which searching will be conducted and how data will be collected and presented. PIPs will also include specific procedures for handling downed seabirds that are found and recovered. See Appendix D: PIP Template.

5.3.4.2 Rehabilitation and Release of Downed Seabirds
KSHCP Participants must submit downed seabirds to an appropriately permitted rehabilitation facility where the birds can be evaluated, treated as needed, and released if possible. Currently all downed birds on Kaua‘i are turned into the SOS program. This program has been in existence since 1978, when the DLNR initiated this community-based conservation effort. Funding to perpetuate the SOS program has come from various sources, but has been primarily funded via the KIUC since 2005, initially as part of their Short Term HCP. KIUC has stated their intent to continue funding the SOS program for a portion of their long term HCP (i.e. the KIUC Long Term HCP, in prep). In the event that the SOS program is no longer available, a veterinarian with appropriate permits to handle listed species would be hired by the Prime Contractor to accomplish this minimization measure (see Section 6.11.12).

The SOS program facility is Federal and State licensed. SOS staff process all downed seabirds and rehabilitate those that require additional care to improve their health and overall condition before release. Downed seabirds are assumed to be able to contribute successfully to population productivity if they are deemed healthy and are successfully released in a timely manner. Through the SOS evaluation process, downed seabirds receive a thorough physical examination including testing of feather waterproofing and treatment of injuries as necessary. In addition, any downed seabirds found dead at a Participant facility property will be turned into the SOS program for research (autopsy, discovery of cause of death, stomach contents analysis) and record keeping purposes.

5.4 CONSERVATION MEASURES TO MITIGATE UNAVOIDABLE IMPACTS (BIOLOGICAL GOAL 2)
Mitigation to offset authorized incidental take of the Covered Seabirds consists of conservation activities to increase breeding probability, breeding success and survival of the Covered Seabirds, and provide a net conservation benefit over the 30-year duration of the KSHCP.

To achieve this objective, a seabird preserve (the Kahuama‘a Seabird Preserve) will be created. Conservation actions at this site will include terrestrial predator proof fencing, predator
eradication and the implementation of social attraction (playing Covered Seabird calls to attract birds on the flyway from neighboring colonies to breed inside the protected predator proof fence). Feral cat control will be conducted to prevent the ingress of cats into the Kalalau Valley colonies as well as keep cats away from the fenceline to prevent reinvasion inside the predator proof fence. Barn owl control will be conducted to further reduce the threat from predation.

Predation at breeding colonies is a primary threat to the survival of the Covered Seabirds (Ainley et al. 2001, Griesemer and Holmes 2011, Raine et al. 2017c, Raine et al. 2017e). Abating the threat of predation through fencing, predator removal, and social attraction is predicted to mitigate the effects of the take authorized under the KSHCP by increasing the breeding production of the Covered Seabirds from the baseline existing condition. The seabird preserve site is located in the north-west of Kaua’i, along the rim of the Kalalau Valley, straddling two State parks: Kōke‘e and the Nā Pali Coast (Figure 5-1). The site is located in a geographic area known as Kahuama’a Flats. Full details on the creation and management of this seabird preserve are included in Appendix A: Kahuama’a Seabird Preserve Management Plan.

Figure 5-1. Kahuama’a Seabird Preserve, located on the rim of the Kalalau Valley.
‘A’o are the primary target of the conservation measures proposed at the Kahuama’a Seabird preserve because the amount of take is higher than the other Covered Species and therefore likely to be requested by the ITP/ITL Applicants in their respective permit/license requests. The lower levels of anticipated take of ‘ua’u and ‘akē’akē by Participants will be offset through active predator control for the introduced barn owl around the preserve and the Kalalau Valley, where both of these seabird species are known to nest (see Figure 5-1).

The selection of a site for a predator proof fence and social attraction project as the primary mitigation strategy to offset take impacts under the KSHCP was based on extensive consultation with conservation agencies and experts in seabird biology using the latest scientific information and analysis. Construction and maintenance of a fenced, predator free enclosure is a preferred conservation measure because it creates a sanctuary for seabird breeding, and is the only assured way to remove all predators. Predator control work alone (without a fence) is not sufficient to prevent all depredation of seabird eggs, chicks, and adults and guarantee a sufficient level of productivity to offset the take impacts anticipated under the KSHCP.

Table 5-2 lists the selection criteria that were used to evaluate the preserve site, how the site ranked in relation to these criteria, and the data source used for the evaluation. These criteria were adapted from an unpublished social attraction site ranking system that was developed by KESRP and a group of experts working on Hawaiian seabirds in 2014 (A. Raine, 2016, pers. comm. and Raine et al. 2014). Local experts, such as the KESRP Coordinator, fencing experts and other seabird biologists were consulted in the evaluation process. Through this process, it was clear that this site is ideal for the purposes of creating a mitigation site that is likely to contribute to the conservation of ‘a’o.

**Table 5-2. Ranking of mitigation site selection criteria.**

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Kahuama’a Seabird Preserve ranking</th>
<th>Data Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presence of breeding seabirds (at site, adjacent or transiting)</td>
<td>Yes: Adjacent and transiting</td>
<td>KESRP auditory surveys in surrounding area (2011-2016); song meter deployed at site in 2016; KSHCP auditory surveys on site (2016 &amp; 2017)</td>
</tr>
<tr>
<td>Habitat Quality</td>
<td>High presence of native plant communities</td>
<td>Site visits; initial plant surveys</td>
</tr>
<tr>
<td>Line collision threat</td>
<td>Low</td>
<td>Powerline distribution maps</td>
</tr>
<tr>
<td>Light attraction threat</td>
<td>Low</td>
<td>No Light Conservation Zone (NLCZ) mapping (USFWS 2016)</td>
</tr>
<tr>
<td>Feasibility of predator removal</td>
<td>High</td>
<td>Expert opinion</td>
</tr>
</tbody>
</table>
The Kahuama’a Seabird Preserve will enclose 2ha of high quality seabird breeding habitat and provides terrain desirable for nesting colonies in terms of slope, aspect and access. The proposed size of the preserve is consistent with other seabird social attraction sites in Hawai‘i (e.g. Makamaka’ole on west Maui, Nihoku on Kaua’i). An enclosure of this size allows for adequate space for both installation of artificial burrows, and also excavation of natural burrows.

A social attraction site has a lag time between the inception of seabird social attraction activities and the successful breeding of seabirds using the site. This is due to several factors, including seabird life history (birds usually begin breeding in year 6), and the time needed for the newly created colony to become established. In order to offset the seabird take impacts that will occur during this lag time, the KSHCP conservation program will provide immediate benefit to the Covered Seabirds via a barn owl and feral cat control in the Kalalau Valley.

Barn owls are a known predator of endangered seabirds on Kaua’i (Raine et al. 2017e). They are aerial predators with a large home range of up to 31 km² (Martin et al. 2014) which makes multiple seabird colonies vulnerable to predation. In addition, when one barn owl is removed from its territory, others quickly move in to occupy the empty territory (G. Reid, 2016, pers. comm.), thus barn owl control needs to be ongoing in any given area. Barn owl control removal is likely to provide both immediate and ongoing benefit to seabirds that breed inside the fence site, in the area around the fence site, and in surrounding source colonies. In this way, this action is likely to offset the take impacts of ‘ua’u and ‘akē‘akē and help offset the take impacts of the ‘a’o covered under the KSHCP.

Feral cat removal is also key to fulfilling Biological Goal 2 as it provides direct benefit to ‘a’o source populations by removing a significant predator of seabird colonies in the Kalalau Valley. It also provides secondary benefit to the Kahuama’a Seabird Preserve by reducing the number of feral cats in the vicinity that might attempt to scale the fence.

Barn owl and feral cat control are components of the KSHCP mitigation package that have the potential to be scaled marginally as an Adaptive Management response (Section 6.9.2). For example, cat trapping lines could be extended into hanging valleys where topography allows or barn owl control could be conducted in smaller adjacent valleys. However, at this time, based on known information on breeding colonies, Covered Seabird life history and habitat, it is not anticipated that expanding predator control within Kalalau Valley alone would provide benefits to completely offset take impacts anticipated under the Plan.
If Covered Activities under an HCP cause take in the form of harm by permanently altering or destroying the habitat of a listed species, then permanent mitigation must occur to offset this impact. In the case of the KSHCP, the Covered Activities will impact individual birds, not habitat (see Chapter 4). Under these circumstances, the mitigation offset must occur for the duration of the period where the take impacts caused by the Covered Activities are expected, but not into perpetuity. For the KSHCP, it is expected that at the end of the 30 year term the social attraction site will be heavily colonized and productive for seabirds, and will be a desirable ongoing project for either extension of the KSHCP, or as mitigation for a different program that must offset take impacts on the ‘a’o. In the latter case, implementation of management activities as the social attraction site would then transfer to the appropriate program. However, in the circumstance that there is no funding available to continue management at this site past the current KSHCP permit term, then funds for Changed Circumstances/Adaptive Management will be used for decommissioning of the fence (see Contingency Funding discussion in Section 7.1).

The details on how the fence and social attraction site will be implemented are presented in Appendix A: Kahuama’a Seabird Preserve Management Plan. This plan includes methods and protocols for specific tasks, timelines, work plans, expected staffing requirements, best management practices, as well as monitoring.

5.4.1 Conservation Measure Alternatives Not Selected
A larger predator proof fence enclosure was considered, but modeling results showed that due to expected high density of nesting, within the enclosure that will result from management at the site, even an enclosure larger than 2ha would not reach carrying capacity within the 30 year permit term. Thus expanding the size of the enclosure would not result in higher seabird production (see Discussion in Appendix C: Social Attraction Estimator Model).

The potential for a smaller predator proof fence enclosure was also considered, to determine if this could achieve necessary production of Covered Seabirds to offset the impacts of take under the KSHCP for a lower cost. It was determined that a minimum of approximately 2ha was necessary to allow for creation of a productive ‘a’o colony and management of native vegetation for seabird habitat. Since the fence site needs to include sloped terrain to facilitate seabird takeoff, a 2ha site or larger minimizes the potential for fence collision during takeoffs and landings of seabirds and fledglings. A smaller unit would also not support enough suitable area for the installation of artificial burrows and habitat restoration for breeding birds to naturally create burrows and nest within the enclosure.

Another conservation measure alternative that was considered was translocation of Covered Seabird chicks to “jump start” the Preserve population within the social attraction site. This was considered not feasible for the following reasons. Considering the rarity of the ‘a’o, the number of active and accessible source burrows is the primary limiting factor for translocation in any given year. Despite ongoing efforts to identify other breeding areas and locate active burrows, there are currently only five stable breeding colonies (Upper Limahuli Preserve, Pohakea, Hanakapi’ai, Hanakoa, and Kīlauea Point National Wildlife Refuge) considered appropriate as a
source for chicks for translocation (due to existing predator control and colony monitoring). All available chicks from these colonies are already being considered for another existing long-term translocation effort (the Nihoku site within Kīlauea Point NWR).

In addition, translocation of chicks requires extensive monitoring of remote colonies to locate nest sites that may be available for chick removal, predator control in these remote locations to offset human traffic during monitoring, and an extended period of care for translocated chicks. All of the above are costly, time intensive, and not likely necessary given the proximity of source seabird colonies to the Kahuama‘a Seabird Preserve. Finally, unlike the Nihoku site, the selected fence enclosure site is located adjacent to the highest concentration of ‘a’o nesting colonies on the island of Kaua‘i, thus providing high confidence that social attraction alone will attract birds to nest within the fence site. It is anticipated that social attraction at the Preserve will provide beneficial seabird production earlier than translocation would, because it attracts juvenile and breeding birds to the site immediately, instead of waiting five to seven years for the translocated chicks to return to begin prospecting and breeding.

Other conservation measures that were considered but not selected include rodent and feral pig control in colonies; predator proof fencing an existing seabird breeding colony; and contributing to a large scale watershed protection project with the Kaua‘i Watershed Alliance (KWA) that is planning to construct ungulate fencing in areas with active seabird nesting. Each of these options was not selected for multiple reasons. Rodent and feral pig control alone, without a fence, requires constant removal of predators to maintain benefit to breeding seabirds, has a lower nesting productivity than a fenced site and creates long lasting human trails within breeding colonies that may facilitate ongoing and enhanced predator presence. Building a predator proof fence directly around existing seabird colonies would provide immediate benefits, however most of the seabird nesting colonies that remain on Kaua‘i are in areas that are difficult to access, are in terrain where fencing is not feasible, or are already targeted for other fencing projects. Contributing to the KWA fencing program was considered infeasible because it (1) targets only removal of ungulates, and does not address feral cats and rats, and (2) logistically, ungulate removal, would be carried out predominantly in areas with low endangered seabird numbers, and would have been very hard to quantify and monitor.

5.5 PERFORMANCE AND SUCCESS CRITERIA
The performance and success criteria for achieving the Goals and Objectives of the KSHCP are provided in detail in Section 7.6 on Mitigation Credit.
6. PLAN IMPLEMENTATION

This chapter discusses the implementation of the KSHCP and related aspects that reflect its programmatic structure and defines the roles, responsibilities, and obligations of all participating entities.

Each Participant in the KSHCP must submit a complete application for an ITP/ITL that will be processed by DLNR and USFWS. If applicable issuance requirements are met, an ITP/ITL will be issued to the Applicant. The ITP/ITL will authorize the Participant to incidentally take the Covered Seabirds in the course of implementing Covered Activities, provided all terms and conditions of the ITP/ITL are met.

Under the KSHCP, the Participants will oversee the implementation of the conservation and other plan-related actions and activities with the assistance of the National Fish and Wildlife Foundation (NFWF) and a Prime Contractor. NFWF will hold the funds received from the Participants for the term of the HCP and will make payments as described below to implement the conservation and other plan-related activities. A Prime Contractor selected by the Participants’ Committee will implement the conservation and other plan-related activities.

6.1 ROLES AND RESPONSIBILITIES

6.1.1 PARTICIPANTS

A Participant in the KSHCP is defined as a non-Federal entity that has been issued an ITP from USFWS and an ITL from the DLNR (collectively referred to as “permits”) under the KSHCP. Each Participant is responsible for ensuring compliance with the terms and conditions of their individual permits, including required funding assurances, implementation of minimization measures, monitoring of take, and fulfilling reporting requirements.

Participant roles and responsibilities include:

1) Compliance with the terms and conditions of their ITP/ITL and Implementing Agreement (IA);
2) Ensuring KSHCP implementation by:
   a. Funding and implementing all required site-specific minimization measures for Covered Activities as set forth in the PIP;
   b. Funding implementation of KSHCP conservation measures commensurate with the amount of take authorized under their ITP/ITL;
   c. Paying all applicable KSHCP-related fees according to the schedule;
   d. Implementing incidental take monitoring for Covered Seabirds;
   e. Monitoring for honu nests if Participant facilities are located on beachfront property(s) with suitable honu habitat and visible lights;
   f. Implementing honu nest protection measures as set forth in the PIP if an active nest(s) is found;
g. Submitting Annual Reports to the Prime Contractor, according to the schedule, that summarize all ITP/ITL related activities implemented, and results for that year;

h. Participating in periodic reviews of their facilities.

Under the KSHCP, Participants will provide funding which will be held by the National Fish and Wildlife Foundation and which will be used to conduct Plan-level mitigation actions according to the schedule established in the KSHCP and in accordance with the provisions of an approved PIP. The Participants’ Committee made up of representatives from each of the Participants will select and contract with a Prime Contractor to conduct the required work to meet mitigation obligations under the ITP/ITL. The Prime Contractor may choose to sub-contract specific work to another entity as appropriate. This arrangement is ‘Participant-initiated’ mitigation and Participants remain ultimately responsible for implementing mitigation (including actions that may be necessary in response to Adaptive Management provisions of the Plan and the PIP) as defined herein.

6.1.2 National Fish and Wildlife Foundation (NFWF) and Prime Contractor

NFWF will establish two accounts in its fiduciary capacity to receive, manage and disburse certain funds to be deposited by the Participants for the purpose of implementing the KSHCP. The KSHCP Conservation Measures Implementation Funding Account will receive the annual payments from the Participants and act as the operating account of the KSHCP. Funds in this account will be used in the near term for mitigation (e.g. predator proof fence, seabird social attraction, barn owl and feral cat control, etc.) and project management (annual reports, coordination with agencies, etc.). The KSHCP Reserve Account will hold funds set aside for financial assurance, early withdrawal, and changed circumstances. NFWF will manage the accounts for the 30-year term of the KSHCP. NFWF will provide semi-annual accounting of the funds in its accounts to the Prime Contractor for use in the Annual Report to the agencies.³

NFWF will provide written notice to the wildlife agencies of its receipt of each of the payments required in Chapter 7, as represented in Table 7-2, from each Participant. Written notice may be provided by either U.S. mail or email to the addresses set forth in the Implementing Agreement, attached as Appendix G. The Participants will provide written notification to the wildlife agencies when disbursements are made from the Reserve Account.

The Participant will procure and enter into an agreement with a Prime Contractor to perform the mitigation and project management measures outlined in the KSHCP. The responsibilities include implementing the Management Plan for the Kahuama’a Seabird Preserve as well as other KSHCP duties. The Prime Contractor will have conservation biology and project

³ The Participants anticipate that NFWF will be the financial institution. If NFWF is not the financial institution, the replacement for NFWF shall be capable of performing duties similar to NFWF for the KSHCP as agreed with approval from USFWS and DLNR.
management experience and will hold recovery permits necessary to conduct its work under Section 10(a)(I)(A) of the Endangered Species Act and/or Sections 13-124-4 and 13-124-6 of the Hawaii Administrative Rules. The Prime Contractor will compile data for the Annual Reports on project progress.

The Prime Contractor will compile, prepare, and submit necessary information to the USFWS and DLNR to enable the agencies to evaluate compliance with the terms and conditions of each ITP/ITL issued under the KSHCP. Table 6-1 below outlines the responsibilities of the Prime Contractor.

Table 6-1. Duties and responsibilities for the Prime Contractor.

<table>
<thead>
<tr>
<th>Responsibilities</th>
<th>Description of Duties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Budget requirements for field work and administrative tasks</td>
<td>Provide annual budget and requests funds to be allocated as necessary to cover field and administrative tasks</td>
</tr>
<tr>
<td>Annual meeting to update Participants</td>
<td>Update Participants; receive feedback</td>
</tr>
<tr>
<td>Annual reporting</td>
<td>Compile, write, and submit Annual Report pertaining to mitigation actions</td>
</tr>
<tr>
<td>Attend ESRC meetings, as requested; Annual ESRC presentation</td>
<td>Submit documents; attend meetings</td>
</tr>
<tr>
<td>Serve as liaison between mitigation work and regulatory wildlife agencies</td>
<td>Data collation as requested; conference calls; meetings; arrange site visits as needed</td>
</tr>
<tr>
<td>Serve as liaison between Participants and regulatory wildlife agencies</td>
<td>Conference calls; meetings</td>
</tr>
<tr>
<td>Seabird social attraction / terrestrial predator proof fence project / feral cat &amp; barn owl control / effectiveness monitoring</td>
<td>Manage field operations</td>
</tr>
<tr>
<td>Minimization monitoring</td>
<td>Compile Participant reports for Annual Report</td>
</tr>
</tbody>
</table>

The Participants anticipate that the initial Prime Contractor will be Pacific Rim Conservation for the initial five years, with options to extend. If a Prime Contractor other than Pacific Rim Conservation is selected, Participants shall consult with USFWS and DLNR regarding selection of an alternate Prime Contractor. Participants shall not be required to obtain approval from USFWS and DLNR of an alternate Prime Contractor, provided that the alternate Prime Contractor has the qualifications stated above.
Seabird recovery and rehabilitation
Coordinate with SOS or contracted entity as needed; assist in coordination of Participant downed bird pick-ups

Take monitoring
Compile and review Participant reports and third-party facility monitoring reports

Adaptive management
Facilitate annual meetings; notify agencies of results and recommendations

Under the terms of the permits issued, the Participants will be responsible for ensuring that the actions and activities of the KSHCP are carried out properly and for selecting another Prime Contractor, if that becomes necessary.

6.1.3 STATE OF HAWAI‘I DEPARTMENT OF LAND AND NATURAL RESOURCES (DLNR)

6.1.3.1 Regulatory Role
The DLNR provides regulatory oversight for the State of Hawai‘i, as authorized by statute, to ensure that all HCPs and ITLs issued by the Board of Land and Natural Resources (BLNR) comply with the provisions of applicable State of Hawai‘i regulations. This section briefly outlines the regulatory role of DLNR as it pertains to the KSHCP if the Plan is approved and ITL/ITPs are issued (Table 6-2).

In 2011, the State Legislature approved HRS 195D-23 allowing the DLNR to collect fees and payment for costs incurred for use of DOFAW’s technical assistance program in the development, review, or monitoring of a specific HCP. This service was not applicable to the development of the KSHCP which was funded by a series of ESA Section 6 HCP planning assistance grants from the USFWS, which also supported application assistance to an initial set of Applicants that participated during the development of the KSHCP.

Section 195D-21(f) of the Hawai‘i Revised Statutes requires that Participants in an HCP submit an Annual Report to the DLNR. The DLNR through the Division of Forestry & Wildlife will review KSHCP Annual Reports for thoroughness, compliance, and effectiveness to ensure that the KSHCP is meeting its objectives and that Participants are each complying with the terms and conditions of ITLs issued.

Table 6-2. DLNR – DOFAW regulatory responsibilities and duties.

<table>
<thead>
<tr>
<th>DLNR Regulatory Responsibilities</th>
<th>DOFAW ITL Section Duties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Authorize, amend, or revoke ITLs (as approved by BLNR)</td>
<td>• Coordinate with Endangered Species Recovery Committee (ESRC) to recommend approval, major amendments, or revoking of an ITL</td>
</tr>
<tr>
<td>Verification of compliance with each ITL issued under the KSHCP.</td>
<td>• Coordinate and ensure DOFAW Administrator is aware of any compliance issues</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
</tbody>
</table>
| Funding and Mitigation Implementation Schedule | • Verify that funding was provided and track funding assurances  
• Review mitigation reports and implementation schedule  
• Verify implementation of mitigation actions |
| Effectiveness Monitoring | • Communicate with Prime Contractor regarding effectiveness monitoring  
• Visit seabird mitigation site as needed |
| Take Monitoring and Minimization Compliance | • Review downed wildlife or observed take reports |
| Adaptive Management | • Review KSHCP Annual Reports to determine if Adaptive Management triggers have been met  
• Attend and arrange meetings as needed  
• With USFWS, make determinations on appropriate Adaptive Management measures if required. |
| Consider recommendations from the ESRC | • Ensure ESRC receives Annual Reports to provide adequate recommendations for Adaptive Management as needed. |
| Submit for OEQC 60-day public comment period any new or significantly revised Participant Inclusion Plans (PIP) | • Assist Applicants with new or revised PIP(s) |

### 6.1.4 Endangered Species Recovery Committee (ESRC)

As an advisory body to the Board of Land and Natural Resources (BLNR), the overall role of the ESRC is to makes recommendations to the BLNR regarding issues relating to endangered species, including the adequacy of HCPs and the issuance of ITLs. The role of the ESRC as defined in statute is to review the KSHCP and any applications for an ITL and to make a recommendation to the Board for approval, disapproval, and recommendations for changes to the KSHCP and/or applications for ITLs. Under HRS §195D-25(b)(2) the ESRC shall also review the KSHCP annually to ensure compliance with the terms of the KSHCP and any ITLs issued and make recommendations for any necessary changes.
6.1.5 **U. S. Fish and Wildlife Service (USFWS)**

The USFWS is the Federal agency responsible for determining whether an ITP associated with an HCP for listed species under its jurisdiction meets issuance criteria and for monitoring and enforcing compliance with issued permits. The following points further describe the roles of the USFWS in the KSHCP:

1) As feasible, provide technical assistance to potential Applicants seeking incidental take authorization from the KSHCP in the drafting of their PIPs.

2) Process applications for ITPs under the KSHCP including providing an opportunity for public review and comment and environmental compliance, as applicable;

3) After considering public comments and all relevant information, issue decisions for applications for ITPs under the KSHCP;

4) Review KSHCP reports, ensure compliance with terms and conditions of each Participants’ ITP, determine the effectiveness of monitoring, minimization, and mitigation actions conducted under the KSHCP, and provide technical assistance to the Participants, and with DLNR, make determinations regarding appropriate Adaptive Management measures;

5) Participate to provide technical assistance at ESRC meetings and KSHCP annual review meetings as needed;

6) Review and process amendments to the KSHCP and to ITPs; and

7) Take enforcement action as necessary and appropriate.

6.2 **ENROLLMENT AND APPROVAL PERMITTING PROCESS**

Enrollment refers to the process by which each Applicant applies for incidental take authorization under the KSHCP.

Each non-Federal entity requesting incidental take authorization will submit a PIP that incorporates the KSHCP by reference and addresses all criteria for permit/license issuance under both State and Federal regulations. The PIP demonstrates how each potential Participant will meet the terms and conditions set forth in the KSHCP. A PIP template is provided in the appendices (*Appendix D: PIP Template*) as a reference for future applicants. This PIP template is a suggested format. Applicants may, but are not required to, follow this suggested format.

The Applicant submits the following documents to USFWS and DLNR which together comprise a complete KSHCP “enrollment package”:

a. Written request (e.g. cover letter) from the landowner, facility operator, or other responsible party that the wildlife agencies formally process the KSHCP enrollment package;

b. State and Federal application forms (with Federal application fee);

c. A completed PIP

d. The final KSHCP by reference.

The KSHCP “enrollment package” application will then be processed through the State and Federal approval processes, outlined below.
The initial enrollment period under the KSHCP will occur for Applicants who complete their enrollment packages prior to the start of the KSHCP public review process, and go through this process in conjunction with the KSHCP document. Going through public review in conjunction with the KSHCP minimizes the workload for initial Applicants, USFWS and DLNR. However, since each Applicant will be applying for a separate ITP/ITL, individual permits are not issued until each PIP has been accepted and approved.

If the BLNR and/or the USFWS issue an ITP/ITL to an entity, the Participant shall convey requisite funds for KSHCP fees to the designated NFWF accounts within 30 days of ITL/ITP issuance. Upon receipt of those funds, the effective date of the ITP/ITL will commence.

6.2.1 Pre-application Process
Applicants are encouraged to meet with DLNR and USFWS to discuss the requirements of the KSHCP and determine if enrollment application is advisable, including:

- Discuss the general effects of the Covered Activities on the Covered Species;
- Discuss measures to avoid take and determine if potential for take can be avoided or minimized as per guidelines in the KSHCP;
- For landowner or business Applicants considering new developments (or additions to existing facilities), the design of new developments offer opportunities to incorporate minimization measures that may be more difficult to implement after developments have been constructed. Those Applicants are encouraged to consult with the wildlife agencies early in the design process to:
  - Incorporate minimization measures in design of the development/facility addition;
  - Incorporate operational measures that minimizes the need for night lighting;
  - Consider other design options that would minimize or avoid potential for take of the Covered Species;
- Review terms and conditions of the KSHCP and the enrollment application process; and
- Review preparation of the PIP as well as the overall schedule for processing KSHCP applications through the State and Federal processes.

6.2.2 Completion of a Qualifying Participant Inclusion Plan (PIP)
A qualifying PIP is prepared by each Applicant and reviewed by the USFWS, the DLNR, and the ESRC as part of the State and Federal approval processes. The following list summarizes the required content that must be included in an Applicant’s PIP:

- Facility ownership and contact information;
- Maps and legal descriptions (such as Tax Map Key) of the property boundaries;
- Maps depicting the locations of the Covered Activities (lights and utilities);
- A thorough and complete description of the Covered Activities, both existing and proposed over the life of the 30 year KSHCP duration;
• A minimization plan for the Covered Activities to reduce the effects of the activities, based on KSHCP guidelines. This section of the PIP will also describe alternatives to the taking that were considered and the reasons these alternatives were not selected;
• Honu minimization and monitoring plan (if applicable);
• Description of training for staff, and any outreach for guests/clients/residents that will occur to maximize seabird recovery at the facility through increased awareness;
• Predator control plan;
• Incidental take estimates for the Covered Species (see methodology below);
• The amount of incidental take authorization requested by species class;
• An incidental take monitoring plan that is based on KSHCP guidelines; and
• A description of the mechanisms that will assure funding over the requested ITP/ITL term (see Chapter 7).

New facilities, whether additions to existing Covered Activities or entirely new facilities, should consult early in the project design phase to evaluate the potential risks of incidental take and to ensure that avoidance and minimization measures are factored into project design to the maximum extent practicable.

As noted above, the DLNR and the USFWS may be able to assist Applicants by providing technical assistance in the preparation of the PIP. Such technical assistance may include, but is not limited to:

• Assist with the description of existing and proposed facilities containing the Covered Activities;
• Site assessments for Covered Activities;
• Assistance with identifying appropriate light attraction minimization measures;
• Refinement of facility take estimates; and other topics as needed.

6.2.2.1 Methods for Determining the Amount of Take of Covered Seabirds

a. Data from the SOS Program

The primary data source for determining annual take of Covered Seabirds is the Save our Shearwaters (SOS) program. This program has a long term and ongoing data set on downed seabirds. These data include information on species, age class, location where the bird was found, and the condition of the bird. Since SOS relies on the public to find and turn in downed birds, a system has been established to standardize collection and reporting. There are eleven SOS shearwater ‘aid stations’ located around the island. Each aid station contains individual cubbies to house birds, a whiteboard and instructions on recording relevant data for each bird. The aid stations are visited daily during the fledging season (September 15-December 15) by SOS staff. The SOS headquarters at the Kaua’i Humane Society is open year-round to accept any seabirds that might be downed outside of this time period. In addition, several of the potential Participants identified during development of the KSHCP have aid stations located at their facilities and have protocols in place to inform SOS when a downed seabird is found. The take
calculation for an individual application may also include consideration of other site specific monitoring collection data where available to refine the SOS numbers. The assessment of where a downed seabird should be attributed to an Applicant’s facility will be based on the best available data.

**b. Calculating the Amount of Light Attraction Take**

The calculation of light attraction take requires the following information:

1. The average number of downed birds on the Applicant’s property that are found and turned into SOS;
2. The amount of “lethal” take calculated from the average number of downed birds that are found and turned into SOS (“observed lethal take”);
3. The amount of “lethal” take attributable to downed birds that are not found on the property and assumed to be “lethal” take (“unobserved take”);
4. The total estimated annual lethal take from light attraction; and
5. The Applicant’s requested annual lethal take.

The sections below explain how each of these determinations is made.

**1. Determining the annual average number of downed birds.**

The first step is to determine the annual average number for downed birds. For the ‘a’o (NESH), the annual average number of downed birds over the most recent 5-year period is used.

For the ‘ua’u and ‘akē’akē (HAPE and BRSP), the annual average number of downed birds over the most recent 15-year period is used. This longer period is used because the fallout of these species is a rarer occurrence.

In most instances an Applicant will choose to use SOS records to calculate its annual averages. However, the Agencies may permit an Applicant to use its own records of downed birds for this calculation if Applicant can demonstrate the reliability of those records.

**2. Determining the annual average of observed lethal take.**

All live birds discovered on an Applicant’s property, whether they are discovered by Applicant or by another party, are turned in to SOS. For purposes of observed take estimation, an Applicant must account for the number of birds that are released to the wild by SOS and the number of birds that die in captivity. Of all discovered birds turned in to SOS (100 percent), 88 percent are released and 12 percent die in captivity (Unpublished SOS data, DOFAW 2018). Consequently, the Applicant multiplies its total observed take by 12% to determine its observed lethal take. The remaining 88% of the total is non-lethal take.

**3. Determining the annual average of unobserved lethal take.**
SOS data represents the “observed” take, i.e., the number of downed birds that are discovered annually on an Applicant’s property and turned in to SOS. Ainley et al. (1995) conducted surveys to locate downed birds and reported an average 50% discovery rate. In other words, ‘best available data,’ indicates that only half of the birds that fallout from the effects of light are actually found and turned in to SOS. In order to account for “unobserved” take, the Applicant must assume that an equal number of birds is not found. The undiscovered birds are considered lethal take as they are likely killed due to injury, starvation, predation or collision (e.g., with vehicles).

Applicants have the option of demonstrating that they have a better discovery rate than the 50% discovery rate found in the literature. For example, at a small facility, with highly trained staff and excellent searching conditions, an Applicant may be able to demonstrate a higher searcher efficiency rate. In order to do so, an Applicant must demonstrate with supporting information (1) that it has higher searcher efficiency than the 50 percent searcher efficiency found in the literature; and (2) that it has created a predator control program that sufficiently minimizes the chance that carcasses will be carried away by predators and not counted. If an applicant believes it has met these requirements it may request in its PIP the assignment of a higher discovery rate. The wildlife agencies will each determine whether they will grant an Applicant’s request to assign it a higher discovery rate which would reduce the unobserved lethal take.

4. Determining the total estimated annual lethal take from light attraction.

If the standard assumptions are used, the following formula summarizes the calculation of an annual estimate of lethal take:

Lethal take = 100% undiscovered birds + 12% of birds that are discovered and turned into SOS

5. Determining the Applicant’s requested annual lethal take.

After determining its estimated annual take from light attraction, the Applicant determines the annual take it will seek. An Applicant may wish to request additional take as a cushion so that it does not have unpermitted take over the life of the permit. Also, as set forth next, while most downed birds are fledglings, an Applicant may wish to increase its take request to account for an occasional downed adult.

The following table illustrates how take is calculated. In this scenario, the applicant’s SOS data shows an average of three Newell’s Shearwaters each year over the last five years, one-half a Hawaiian Petrel each year over the last fifteen years and one Band-rumped Storm Petrel each year over the last fifteen years. This applicant is unable to demonstrate better than 50% searcher efficiency.
### Annual Take Calculation

<table>
<thead>
<tr>
<th>1. Annual average number of downed NESH (5 most recent years), HAPE or BRSP (15 most recent years)</th>
<th>Newell’s Shearwater</th>
<th>Hawaiian Petrel</th>
<th>Band-Rumped Storm-Petrel</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>.5</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

| 2. Annual observed lethal take estimate (12% of 1, all downed birds) | .36* | .06 | .12 |

| 3. Annual unobserved lethal take estimate (e.g. 100% of 1, all downed birds if 50% searcher efficiency assumed) | 3 | .5 | 1 |

| 4. Total estimated annual lethal take from light attraction (2+3) | 3.36** | .56 | 1.12 |

| Requested Annual Lethal Take | 4*** | 1*** | 1.12 |

* $3 \times .12 = .36$
** $3 + 0.36 = 3.36$
*** This applicant has elected to request more take than projected because it anticipates an occasional downed adult (see discussion in item 5, above) and to provide a cushion so that it does not have unpermitted take.

### c. Adult Light Attraction Take

Most downed seabirds, especially ‘a’o, are fledglings (see Section 4.2.1); however, KSHCP Applicants may request incidental take coverage for adult/sub-adults due to light attraction. These take requests must also address indirect take of dependent eggs or chicks.\(^5\) As described in section 4.2.1.1, an average take in total of all applicant take combined of 2 ‘a’o adult every 3 years (1 lethal and 1 non-lethal), 2 ‘ua’u every year (1 lethal and 1 non-lethal), and 1 ‘akē‘akē (0.5 lethal and 0.5 non-lethal) are anticipated under the Plan. As described in Section 4.3, a complete in-year offset of adult lethal take impacts covered under the KSHCP is likely to be provided annually by the barn owl control and feral cat control at Kalalau Valley.

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\(^5\) Indirect impacts of covered activities are analyzed in the intra-Service section 7 consultation on ITP applications associated with an HCP (section 1.2.1 and 50 CFR 402.02). Indirect impacts are considered reasonably certain to occur when an adult(s) are attracted to artificial lighting (section 4.2.1.1). Therefore, applicants requesting coverage for direct take of adults must also request coverage of indirect take of eggs/chicks.

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The number of adult age-class birds must be converted to the equivalent number of fledgling age-class birds because costs are shared and most Applicants’ take is anticipated to be for fledgling age-class. For the purposes of this HCP, the take of one adult of any Covered Seabird will equal take of 3 fledglings, assuming juvenile/sub-adult survivorship (i.e., percentage surviving till age 6) of 0.33. In addition, the amount of indirect take associated with each direct take of an adult, lethal or non-lethal, will be as follows, assuming the reproductive information described in Section 4.2.1.2 (authorities for this information cited in parentheses):

- 0.18 chicks or eggs for each ‘a‘o take (Griesemer and Holmes 2011);
- 0.32 chicks or eggs for each ‘ua‘u take (Simons 1984, Simons 1985); and
- 0.20 chicks or eggs for each ‘akē‘akē take (Hemery et al. 1986 in Mougin et al. 1997, Cadiou 2001).

Consequently, the total fledgling offset for each direct adult take will equal 3.18 fledglings for each ‘a‘o take, 3.32 fledglings for each ‘ua‘u take, and 3.20 fledglings for each ‘akē‘akē take.

d. Extrapolating 30-year Take Estimates

The methods described above are used to determine estimates of annual lethal and non-lethal light attraction take for fledglings of each of the Covered Seabird species. For the purposes of the KSHCP, each Participant also needs to estimate a 30-year amount of fledgling light attraction take to determine overall take estimates for the permit term of the ITP and ITL. This is accomplished by simply multiplying the annual light attraction take estimates by 30.

This method assumes that take due to the effects of light attraction will remain constant over the 30-year duration of the KSHCP and associated ITPs and ITLs. However, the population of ‘a‘o is estimated to have declined by 94% (at an average rate of ~13% per year) from 1993-2013 and is predicted to continue to decline (Raine et al. 2017d). Populations of ‘ua‘u are estimated to have declined by 78% (at an average rate of ~6% per year) during the same period (Raine et al. 2017d). Figures are not available for ‘akē‘akē. This would suggest a future decline in SOS program fallout numbers if fallout patterns track the overall population. However, between 2010 and 2015 fallout numbers have been stable for the ‘a‘o (Figure 6-1). Fallout numbers have been relatively constant for the ‘ua‘u since the year 2000. It is important to note that the up-tick in adult take numbers for 2015 represents one large fallout event that occurred at the Kōke‘e Air Force base (see Raine et al. (2015) for details). Since this event, lights have been drastically reduced (or eliminated) to address this light attraction issue and KESRP surveys in 2016 found no downed birds when lights were turned off (Raine et al. 2016c, USFWS 2017b); new ground lighting is yet to be assessed.

Indirect impacts of covered activities are analyzed in the intra-Service section 7 consultation on ITP applications associated with an HCP (section 1.2.1 and 50 CFR 402.02). Indirect impacts are considered reasonably certain to occur when an adult(s) are attracted to artificial lighting (section 4.2.1.1). Therefore, applicants requesting coverage for direct take of adults must also request coverage of indirect take of eggs/chicks.

patterns, and result in the loss of a chick or egg.
Given this recent SOS program trend, the KSHCP assumes that light attraction take estimates will remain constant for the 30-year duration of the Program. This assumption, while conservative, also serves to ensure sufficient take coverage and mitigation are provided for KSHCP Participants. Recovery actions and conservation associated with this and other seabird HCPs may also contribute to significantly reducing the current declining population trends of the Covered Species.

Figure 6-1: SOS program recoveries of ‘a‘o by age class 2000-2015.

6.2.3 State Approval Process
The State of Hawai‘i Board of Land and Natural Resources (BLNR) approval process of the KSHCP and ITL issuance decision process is outlined below. The process is separated into two steps: (a) approval of the KSHCP document and (b) approval of each PIP when submitted:

1. Review of the KSHCP document:
   a. The DLNR reviews the KSHCP for consistency with State regulations on the take of a listed species (HRS § 195D);
   b. The Office of Environmental Quality Control (OEQC) publishes in the periodic bulletin a notice of availability of the KSHCP document and associated PIPs for a 60-day (minimum) public comment period (HRS § 195D-21(6)); During the 60-day comment period:
      c. The DEA will post for a 30-day comment period;
      d. The Endangered Species Recovery Committee (ESRC) meets to review and comment on the KSHCP document;
      e. DOFAW holds a public meeting on Kaua‘i (HRS § 195D-4(g)(9));
      f. The ESRC conducts a public site visit/meeting;
      g. DOFAW addresses comments received in coordination with USFWS;
      h. ESRC meets to review the revisions resulting in the final draft and make a recommendation on the KSHCP package, to the BLNR;
i. The BLNR issues a decision on the KSHCP and ITLs.

2. Review of each PIP when submitted for approval:
   a. OEQC publishes in the periodic bulletin a notice of availability of each completed PIP for a 60-day (minimum) public comment period;
   b. Endangered Species Recovery Committee (ESRC) reviews the PIPs, including take request and any staff recommendations, for consistency with the KSHCP terms and conditions and applicable State laws;
   c. The Applicant responds to comments received and revises PIP, if needed;
   d. The ESRC makes a recommendation to the BLNR on each PIP;
   e. The BLNR holds a public hearing on each ITL application (HRS § 195D-4(g)(9);
   f. BLNR Board Meeting to review applications;
   g. The BLNR issues a separate issuance decision for each ITL.

6.2.4 FEDERAL APPROVAL PROCESS
The USFWS ITP issuance decision process for an ITP is outlined below.

1. To streamline review of individual permit applications, USFWS publishes a Notice of Availability of the KSHCP document, each PIP submitted as part of the enrollment process, and a draft environmental assessment on the potential issuance of incidental take permits based on the KSHCP in the Federal Register for a public comment period;
2. USFWS responds to public comments received, advises DLNR of revisions or additional measures it believes are necessary or appropriate for purposes of the KSHCP, works with each Applicant to revise the PIP(s), if needed, and revises the EA, as appropriate;
3. USFWS prepares a Biological Opinion in accordance with the requirements of ESA Section 7 on the KSHCP to evaluate whether implementation of the KSHCP is: (1) likely to jeopardize listed species or destroy or adversely modify critical habitat;
4. USFWS determines whether it is appropriate to issue a NEPA Finding of No Significant Impact (FONSI) based on information in the EA, or to prepare an Environmental Impact Statement (EIS);
5. If necessary, USFWS conducts scoping and prepares an EIS;
6. USFWS prepares findings on the proposed ITP request for each PIP application to inform the permit decision and makes a decision whether to issue the permit.

6.3 LATE ENROLLMENT
The KSHCP is designed to be available as a mechanism for all non-Federal entities with ongoing take of Covered Seabirds to obtain an ITL/ITP. Throughout the development of the KSHCP (~10 year period), there were many attempts to recruit eligible Applicants, and distribute information regarding this unique opportunity. These efforts have included: public meetings, visits to potential Applicant facilities, producing informational flyers, maintaining a KSHCP website, and presentations at conferences.

After the initial decisions on the applications of Applicants who have completed the public review process simultaneously with the review of the KSHCP itself, other Applicants may be
able to join the KSHCP during the 30 year term of the KSHCP provided that certain conditions, described below, are met. These Applicants must submit their PIPs to the Participants for review and concurrence, to the wildlife agencies for processing (which will include an opportunity for public review), and obtain permits. Permits issued would cover the added Participants' incidental take through the remaining duration of the KSHCP. For example, a new Applicant in the tenth year of implementation would request coverage for the remaining 20 years of the KSHCP. In the review of any Applicant’s PIP, Participants may not engage in any discrimination that is prohibited by any applicable federal, state, or county law.

The KSHCP has been developed to accommodate a maximum annual and 30-year take number (see Section 4.2) for each of the Covered Seabirds. If the inclusion of additional Participants past the initial enrollment period does not exceed the maximum annual take threshold (Table 4-1), new Applicants may enroll as described above, and shared costs will be adjusted (see Section 7.4), provided however that such joinder shall not increase the costs to the Participants. If the addition of a new Applicant would exceed the maximum take number, then an amendment to the KSHCP would be required to revise the Plan as needed, provided however that such amendment shall not increase the costs to the Participants. Nothing in this section is intended to alter the changed circumstances and “no surprises” provisions of this KSHCP. If it is considered more cost effective for the Applicant seeking take coverage to initiate their own HCP, rather than amending the KSHCP, this will be recommended during pre-application discussions.

6.4     EARLY WITHDRAWAL AND DISCONTINUANCE OF PERMITTED ACTIVITY

Similarly, due to the unique nature of the KSHCP and the need to make it flexible to accommodate individual Participant needs, it is anticipated that some Participants may request Early Withdrawal. For this to occur, a Participant will need to provide written notice to the other Participants and the regulatory agencies sufficiently demonstrating: (1) that it has made all payments required up to the time of withdrawal and will pay any remaining funds required to ensure full mitigation for take that has occurred; and (2) why Covered Activities/incidental take will cease to occur at facilities. If, for example, all lights will be deactivated, then funds to cover requested take up to the point of Early Withdrawal will be collected, and the Financial Assurances and Changed Circumstances Payments will be retained in the NFWF accounts for use by the remaining Participants to defray KSHCP implementation costs (see Section 7.4.2). The Participants may elect to initiate a Major Amendment if there is a reduction of greater than 10% of the initial authorized take (see Section 6.13.2).

In addition, after surrendering the permit, the Participant will remain responsible for any outstanding minimization and mitigation measures required under terms of the permit for take that has occurred prior to surrender of the permit. Notice to USFWS must comply with the regulations applicable at the time of withdrawal (currently codified at 50 C.F.R. § 13.26.). Costs will be adjusted for remaining Participants as described in Section 7.4.
6.5 REVISED INCIDENTAL TAKE REQUEST

Another possibility is that Participants will wish to revise their initial incidental take requests. Take requests may be increased or decreased, depending on specific circumstances at facilities such as a need for additional lights, or in response to the results of take monitoring. Any proposed change to a Participant’s take requests would require an amendment to the permit and PIP pursuant to regulations in effect at the time the Participant submits their request (as described in Section 6.14). If the incidental take request increases, the request will be evaluated to determine whether the conservation program can mitigate for additional take, and if so, the Participant will be responsible for increased funding to offset the additional take request, provided however that such take increase shall not increase the costs to the other Participants. If the incidental take request decreases, as described above with Early Withdrawal, Participants must ensure that their take amount is fully mitigated. Requests to amend take in PIPs should be submitted as part of Participant Annual Reports for review by regulatory agencies. Costs will be adjusted for remaining Participants as described in Section 7.4.

6.6 REPORTING REQUIREMENTS

Reporting is necessary to provide regular information and updates to the USFWS and the DLNR to ensure that the KSHCP is meeting its objectives and to demonstrate that each Participant is in compliance with the terms and conditions of its permit. Reporting will provide information to address compliance with the terms of the ITP/ITLs issued and effectiveness both of permits issued and of the KSHCP as a whole. This section outlines the reporting requirements of the responsible parties.

6.6.1 PARTICIPANTS’ REPORTING REQUIREMENTS

6.6.1.1 Reporting Take of Covered Species

Within 24 hours of discovery, any Participant shall submit notice of any incidental or other take of any of the Covered Species at the authorized covered facilities via phone, email, or other written form to the USFWS, DLNR, Kaua‘i DOFAW and SOS, including date, time and exact location where found, species (if known), and condition of the animal. The agencies will provide names, phone, and email contact information to the participants on a regular and updated basis of those individuals to be contacted.

Within one week of discovery, any Participant shall provide USFWS and DLNR Honolulu the completed “KSHCP Downed Seabird Form” and a description of any further actions taken or considered to minimize fallout at the incident location.

In addition to reporting take as required by the above protocols, a full take monitoring report will be submitted annually as part of Participant Annual Report, following protocols from Participant Monitoring Plans, which will be described in PIPs. The Participant Annual Report should include information as described in the next Section.
6.6.1.2 Participant Annual Reports

KSHCP Participants shall provide annual status updates covering the preceding calendar year to the Prime Contractor no later than Jan 15 of each year. Photographs should be included in the Annual Report to illustrate any proposed changes to lighting, facility predator control programs, outreach and training or downed bird recovery protocols on site.

The status updates shall provide the following information:
   a. Facility name, ownership and contact details;
   b. Summary of any proposed changes to the facilities with potential to affect the Covered Species;
   c. Changes to facility management or other key personnel involved in the KSHCP;
   d. Request from a Participant to change minimization measures conducted at the facility and the reasons for the requested change (as needed);
   e. Summary of the results of self-monitoring of take of the Covered Seabirds and monitoring for honu nests, including:
      i. Map of search route used for conducting searches;
      ii. Frequency of searches conducted;
      iii. Personnel involved in search efforts;
      iv. A summary table of the search effort results to include: number of birds or honu nests found, the date, time, and exact location where each was found, disposition of the birds or nests (if known), including description of any honu nest protection efforts implemented;
      v. A discussion of the efficacy of the current self-monitoring protocols and whether adjustments need to be made;
   f. Summary discussion of the results of on-site animal control efforts;
   g. Summary of worker training and outreach efforts;
   h. Other relevant information that the wildlife agencies may require to verify compliance with permit issued.

6.6.1.3 Other Relevant Reporting

Some changes at facilities may require immediate reporting outside of the Annual Report time window. Participants must inform USFWS and DLNR prior to any of the following changes:

1. Changes in property ownership (may require permit transfer or amendment), Participant must report:
   a. New ownership name, company/organization;
   b. Primary and alternate contact information;
   c. Changes to property boundaries, planned or proposed, with updated map/survey of property.

Any transfer of the Federal permit must be accomplished in accordance with the applicable regulations in existence at the time of transfer (currently codified at 50 C.F.R. § 13.25.). If change in ownership involves discontinuance of permit activities or requests for changes in incidental take amounts, these changes must also be made in accordance
with federal regulations. See Sections 6.4 and 6.5 above. In these cases, Participants should report any planned or proposed change in ownership well in advance of the change.

2. Changes to the permitted facility, both proposed and planned, with potential to affect the Covered Species (may require an amendment to the permit) including, but not limited to:
   a. Expansions or additions to existing facilities;
   b. New facilities and facility light changes;
   c. Reasons why changes were made.

   Any additional incidental take due to changes at a permitted facility will require an amendment to the permit in advance of the change occurring. Amendments to authorize additional take must comply with all applicable Federal and State requirements; therefore, it is important for Participants to report any planned or proposed change well in advance so that they can work with the wildlife agencies to determine if a permit amendment is possible.

3. Changes to take requests (increase or decrease). Any potential changes to take requests will require an amendment to the permit in advance of the change. Amendments to authorize additional take must comply with all applicable Federal and State requirements; therefore, it is important for Participants to report any planned or proposed change well in advance so that they can work with wildlife agencies to determine if a permit amendment is possible.

4. Any material changes in the Participant’s financial ability to fulfill its obligations under the permit.

6.6.1.4 Certification

All reports will include the following certification from a responsible company official who supervised or directed preparation of the report:

I certify that to the best of my knowledge, after appropriate inquiries of all relevant persons involved in the preparation of this report, the information submitted is true, accurate, and complete.

6.6.2 KSHCP Annual Report

The Prime Contractor shall prepare and submit to the DLNR and the USFWS an Annual Report on behalf of the Participants, according to the Annual Report requirements (Section 6.6.2.1 through 6.6.2.8) and Reporting Schedule detailed below (Section 6.7).

6.6.2.1 General Topics

1) Summary of any non-substantive changes made to the KSHCP Appendices in the preceding year (e.g., final Memorandums of Agreement(s), contracts, etc.);
2) Any changes in the reporting schedule for the KSHCP, as determined by the ESRC, the USFWS, and the DLNR;
3) Description of all amendments initiated, underway or completed during the preceding year and their status;
4) Any other pertinent information of a general nature that would illustrate the status of the KSHCP and compliance and effectiveness of the KSHCP.

6.6.2.2 Summary of KSHCP Participants’ Annual Reports
The Annual report should provide a summary of the KSHCP Participants’ Reports including:

1) Name, location, facility type, ownership, and permitted incidental take (by species) of existing Participants;
2) Summary of any changes to the facilities of existing Participants (may require permit amendment);
3) Any changes in ownership of existing Participants (may require permit amendment);
4) Summary of results of take monitoring at Participant facilities;
5) Summary of results of compliance monitoring of implementation of minimization measures at Participant facilities;
6) Summary of KSHCP financial status of existing Participants, including any KSHCP mitigation fees owed;
7) Any other information that would demonstrate compliance with the terms and conditions of permits issued;
8) The status of any KSHCP Applicants in process and anticipated take level by species and age class.

6.6.2.3 KSHCP Finances
The Financial status of the KSHCP should be provided to include:

1) An accounting of funds received to date and KSHCP fees paid by each Participant;
2) An accounting of funds expended;
3) Overall financial status of the KSHCP;
4) Any changes in anticipated budget expenditures (e.g., through Adaptive Management).

6.6.2.4 Compliance and Effectiveness Monitoring of Mitigation
1) Overall status of mitigation action including:
   a. Progress towards KSHCP mitigation objectives;
   b. Updates on schedule for the mitigation project;
   c. Description of any issues encountered and successes towards implementing the project;
   d. Recommendations to initiate any Adaptive Management as needed.
2) Evaluation of the effectiveness of conservation/mitigation projects including:
   a. Summary of results from effectiveness monitoring to date;
   b. Updates and status of any projects or components pending implementation; and
c. Status of any anticipated plans for initiating projects during the upcoming year

6.6.2.5 Compliance Monitoring of Take of the Covered Seabirds
1) Status reports and an evaluation of take monitoring including:
   a. Status of monitoring of take of the Covered Seabirds from light attraction, including self-monitoring conducted by Participants;
   b. A summary of take to date, by species and age class, resulting from take monitoring.

6.6.2.6 Honu Monitoring and Protection
1) Status of honu nest monitoring and measures taken to avoid take of honu if nest(s) are found.

6.6.2.7 Adaptive Management
1) A summary of all changes made to date resulting from Adaptive Management, triggers encountered, and responses initiated;
2) Discussion of any proposed changes to management based on Adaptive Management framework.
3) Discussion of any issues encountered as part of implementing Adaptive Management.

6.6.2.8 Additional Topics
1) Descriptions of KSHCP-related public meetings held during the reporting period;
2) Areas of KSHCP implementation meriting technical and/or scientific review;
3) Summary of any new relevant findings, reports, or published studies that pertain to seabird and/or honu conservation;
4) Any other pertinent information that would demonstrate the compliance and effectiveness of the KSHCP and permits issued under the Plan.

6.7 KSHCP REPORTING SCHEDULE
The KSHCP reporting schedule provides the anticipated due dates of reporting deliverables, responsible parties and review actions. The Annual Report shall consolidate all reports and updates of the KSHCP according to the reporting schedule (Table 6-3). In order to best use reports to make annual Adaptive Management changes to the minimization and mitigation, the season for reporting will fall during the interim season when seabirds are not present on the island (December-April). The Annual Report will be discussed at the KSHCP Annual Meeting mid-March. At this meeting any changes in management, monitoring, or minimization actions at Participant facilities will be discussed (see Section 6.9 for Adaptive Management process). A final version KSHCP Annual Report shall be submitted to the USFWS and the DLNR by April 15.

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8 AG/AS will revisit report dates and suggest revisions.
If a Participant report is not submitted on time or is inadequate (e.g., missing information), the responsible party shall be notified by the wildlife agencies in writing and must demonstrate compliance with the reporting requirement within thirty (30) days. If a Participant fails to comply within the allotted time, the USFWS and the BLNR may initiate permit suspension procedures or revocation procedures (50 CFR 13.27 - 13.28)(HRS § 195D-21(d)).

Table 6-3. KSHCP Reporting Schedule by Report Type, Responsible Party, and Due Dates.

<table>
<thead>
<tr>
<th>Report Type/Action</th>
<th>Who</th>
<th>Due Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Submit draft Participant Annual Report to the Prime Contractor</td>
<td>Participants</td>
<td>Jan 15</td>
</tr>
<tr>
<td>Submit draft KSHCP Annual Report to USFWS and DLNR</td>
<td>Prime Contractor</td>
<td>Feb 28</td>
</tr>
<tr>
<td>Annual KSHCP Review meeting</td>
<td>Participants, Prime Contractor, USFWS, DLNR</td>
<td>March 15-21</td>
</tr>
<tr>
<td>Final KSHCP Annual Report</td>
<td>Prime Contractor</td>
<td>April 15</td>
</tr>
<tr>
<td>Final KSHCP Annual Report to State (legislative deadline)</td>
<td>Prime Contractor</td>
<td>Aug 1</td>
</tr>
</tbody>
</table>

6.8 MONITORING
There are three types of monitoring addressed in the KSHCP: compliance, effectiveness, and take monitoring.

- “Compliance monitoring” verifies implementation of the HCP terms and conditions by the individual Participants and the Prime Contractor. Annual reports and reporting requirements (as outlined in Section 6.6) will be provided by each Participant and the Prime Contractor to document that the Participant has performed all of the required tasks and activities. (Actions on site to reduce/eliminate light attraction).
- “Effectiveness monitoring” evaluates the success of the HCP to minimize and mitigate take of listed species to the maximum extent practicable; evaluating whether minimization measures are effective and sufficient; and the extent to which mitigation measures are successful.
- “Take monitoring” determines when and where take of Covered Species occurs, and documents monitoring efforts.

6.8.1 COMPLIANCE MONITORING
The KSHCP objectives delineate minimization and mitigation actions that will achieve specific desired outcomes for the Plan duration (see Table 5-1). Each individual PIP identifies actions specific to each Participant. Compliance monitoring evaluates whether those actions are being properly implemented and is used to ensure that each enrolled Participant meets its obligation under this HCP and the individual PIPs.
Monitoring compliance with minimization actions at Participant facilities will occur via agency review of Participant Annual Reports. As described in Section 6.6.1, these reports will contain summaries, maps and photographic evidence of minimization actions that are implemented at facilities. Follow up visits by regulatory agency staff may occur as needed to validate compliance.

Monitoring compliance with mitigation actions will similarly occur via agency review of the KSHCP Annual Report. These reports will describe status of the mitigation project and progress towards meeting KSHCP objectives (see Section 6.6.2), including supporting data. Staff from regulatory agencies will also visit the mitigation site as needed.

### 6.8.2 Effectiveness Monitoring

Effectiveness monitoring is necessary to review whether the measures being implemented as part of the HCP and associated PIPs are as effective as predicted at the time of development of this HCP. Effectiveness monitoring identifies if and when a specific measure is ineffective and provides information if the measure is ineffective, to ultimately support a determination on whether the proposed minimization or mitigation measures can be modified through Adaptive Management (see Section 6.9) or whether the HCP itself needs to be amended.

At Participant facilities the following will be evaluated: the efficacy of methods used to minimize instances of light attraction, the success of on-site predator control, training and outreach to increase the likelihood of finding downed birds. The evaluation will be based on Participant Reports (see details in Section 6.6.1.2). Additional effectiveness monitoring visits by the regulatory agencies may take place if necessary.

Protocols for effectiveness monitoring to evaluate progress and success are described in detail in Appendix A: Kahuama’a Seabird Preserve Management Plan for the KSHCP mitigation objectives. These objectives require three aspects of biological monitoring: monitoring of predator eradication/suppression, monitoring of vegetation (habitat) management, and monitoring of Covered Seabird response to management.

### 6.8.3 Take Monitoring

Take monitoring to compare actual rates of take to requested amounts will also be conducted at Participant facilities. Each participant will provide a Covered Seabird Monitoring Plan in their PIP. The components that will be included, and the KSHCP guidelines/standards are presented in Table 6-4.

<table>
<thead>
<tr>
<th>Take monitoring component</th>
<th>KSHCP Guideline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detailed maps of the property indicating structures and property features (including all light sources); topography; any</td>
<td>All searchable areas must be covered in defined search routes (attach map). Justify “unsearchable areas”.</td>
</tr>
<tr>
<td>unsearchable areas; and the proposed search route</td>
<td>Must cover seabird identification, seabird handling, appropriate downed birds search methods, and response procedures. Recommend training to occur immediately prior to Sept 15 (start of fallout season).</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Description of annual training for searchers</td>
<td>Time of Year of searches</td>
</tr>
<tr>
<td>Time of Year of searches</td>
<td>Frequency of searches</td>
</tr>
<tr>
<td>Frequency of searches</td>
<td>Time of day of searches</td>
</tr>
<tr>
<td>Time of day of searches</td>
<td>Search methods</td>
</tr>
<tr>
<td>Search methods</td>
<td>Record keeping method</td>
</tr>
<tr>
<td>Record keeping method</td>
<td>Presence of seabird predators on site (cats, dogs, mongoose)</td>
</tr>
<tr>
<td>Presence of seabird predators on site (cats, dogs, mongoose)</td>
<td>Number of searchers needed to cover area.</td>
</tr>
</tbody>
</table>

As provided in Section 6.2.2.1.1, the take calculation for an individual application may also include consideration of other site specific monitoring collection data where available to refine the SOS numbers. The assessment of where a downed seabird should be attributed to an Applicant’s facility will be based on the best available data.

### 6.9 ADAPTIVE MANAGEMENT

USFWS policy defines Adaptive Management as “a formal structured approach for addressing uncertainty in natural resources management using the experience of management and the results of research as an ongoing feedback loop for continuous improvement” (USFWS and NMFS 1996). Uncertainties may include limited biological information for the Covered Species,
a lack of knowledge about the effectiveness of mitigation or management techniques, or doubt about the anticipated effects of Participants’ facilities on Covered Species. Adaptive management recognizes that full information necessary to make decisions is often unavailable, and allows for change of management practices when supported by data or other information. It allows for the incorporation of new information into conservation and mitigation measures during KSHCP implementation.

6.9.1 ADAPTIVE MANAGEMENT OF MINIMIZATION MEASURES

Although KSHCP uses the best available information to evaluate measures to minimize incidental take of Covered Species, new or untested minimization measures to reduce incidental take of Covered Species may be introduced over the course of the KSHCP. Participants may consult at any time with USFWS and DLNR to determine if implementation of new technologies is practicable and appropriate, and develop monitoring protocols to measure the effectiveness of new measures. This might include a different design of lighting, different bulbs or more effective searching strategies.

Participants will also identify the need for Adaptive Management of minimization measures in their Participant Annual Reports, and suggest options to alter currently implemented measures. These will be discussed during the KSHCP Annual Review Meeting or in individual meetings with the regulatory agencies, and will be implemented as soon as reasonably possible.

In addition, a running 5 year average of take will be evaluated annually to enable Adaptive Management of minimization efforts. The 5 year averages will serve as triggers to inform individual Participants, the Prime Contractor and the regulatory agencies that changes are needed to increase minimization and reduce annual take to avoid exceeding the 30 year take request. In the event that take monitoring results indicate potential take exceedance, additional avoidance or minimization measures would be required through Adaptive Management. Specific measures will be tailored to relevant Participant facilities and will follow minimization guidelines outlined in Section 5.3 and Appendix E: Guidelines for Adjusting Lighting at Facilities.

Adaptive Management is intended to provide an opportunity to improve programs based on implementation efforts and results. As a result, successes and failures at individual Participant facilities will be evaluated and the results shared among all Participants so that best practices for lighting, predator control on facility, worker training, and guest outreach can be constantly refined, improved, and shared among all Participants.

6.9.2 ADAPTIVE MANAGEMENT OF MITIGATION MEASURES

Uncertainties exist regarding the long-term effectiveness of the mitigation site. Social attraction efforts have shown excellent results in other projects worldwide, but there exists some uncertainty that may influence the effectiveness of the KSHCP social attraction project, including, for example, changes in the projected decline of the Covered Seabirds’ population which might affect the number of birds available to colonize the social attraction site.
A conservative estimate of fledgling reproduction (**Appendix C: Social Attraction Benefit Estimator**) was selected to provide a high level of confidence and certainty in the reproductive outcome that will result from implementation of the social attraction project and associated barn owl and feral cat control. However, in the event that KSHCP Objectives (see Section 5.2) are not reached as scheduled (e.g. prospecting birds have not been observed at the mitigation site by year 4 after fence construction, or birds have not begun breeding by year 5-7, etc.), the Participants and the Prime Contractor will meet with USFWS and DLNR to evaluate probable reasons and possible options using the Adaptive Management process described above.

Failure to meet KSHCP objectives by target dates is the trigger for Adaptive Management discussions, and implementation, as needed. Specific management options to address delays in meeting mitigation objectives are outlined in Section 16 of **Appendix A: Kahuama’a Seabird Preserve Management Plan**, but Adaptive Management is not limited to those options.

The Year 10 KSHCP objective (Cumulative upward trend in Covered Seabird breeding documented at mitigation site) is a significant milestone in terms of Adaptive Management. Absent a catastrophic event, it is anticipated that this is the first year of the KSHCP that abandonment of the social attraction site, and redirecting existing funds towards an alternative mitigation project would be considered. Given the life history of ‘a’o, with long generation times (5-6 years), any earlier would likely not provide enough time and data to justify this decision. At Year 10, if this target is not met, and the USFWS and DLNR, with input from the Prime Contractor and Participant representatives, determine further Adaptive Management strategies will not be successful, funds may be shifted to a different mitigation alternative and funded as specified in **Section 6.11.11** to achieve mitigation benefits committed to by the KSHCP.

Mitigation options may include (but are not limited to) expanding predator control (barn owl, feral cats or rats) and / or funding conservation actions implemented by DOFAW, the Kaua‘i Watershed Alliance (KWA), the Kaua‘i Endangered Seabird Recovery Project (KESRP), or another entity approved by USFWS and DLNR that provide direct benefit to Covered Seabirds. These in-depth changes to the management protocols or the scope of the mitigation actions may be addressed as an amendment to the KSHCP as determined by USFWS and DLNR, which would require compliance with applicable requirements, including possibly supplemental NEPA analysis.

The Adaptive Management process for the KSHCP mitigation measures consists of the following steps:

1. The draft KSHCP Annual Report will include a thorough review and analysis of biological data. Through these analyses, the Prime Contractor will identify whether biological objectives are being met by the target dates, and if not, will suggest any necessary Adaptive Management responses to be implemented. Responses may correspond to the preliminary list of potential Adaptive Management for proposed actions, as described in Section 16 of **Appendix A: Kahuama’a Seabird Preserve Management Plan** or may result
from consultation with experts. The need for Adaptive Management may also be identified by DLNR and/or the USFWS. Adaptive management measures are not limited to those described in Appendix A.

2. During the KSHCP Annual Review meeting, the Prime Contractor will receive input from USFWS, DLNR, and Participant representatives on suggested Adaptive Management options, and the USFWS or DLNR as regulatory agencies can disapprove of proposed measures, if necessary. The Prime Contractor will make the final decisions on Adaptive Management after discussion and input by the USFWS, DLNR and Participant representatives, but Participants remain responsible for meeting the biological objectives of the KSHCP.

3. Adaptive management of minimization and/or mitigation measures will occur as soon as reasonably possible following a decision(s).

4. The final KSHCP Annual Report will include the Adaptive Management measures selected by the Prime Contractor after consultation with USFWS and DLNR.

6.9.2.1 Applying Results of Covered Seabird Monitoring through Adaptive Management

Results of biological monitoring for Covered Seabirds will be compared against predictions from the social attraction estimator model. Model results reflect possible outcomes for the number of seabird burrows likely to be present, fledglings produced, and population trends within the fenced enclosure. Table 6-5 presents initial model results (see Appendix C: Social Attraction Benefit Estimator for details on model inputs) for the number of seabird burrows predicted at 5-year time intervals for the life of the mitigation project. These give context for the KSHCP Objectives and will help to direct Adaptive Management decisions.

Although the total number of seabird burrows predicted is presented here, seabird burrows are very cryptic and it can be difficult to determine their exact location. One study found a human searcher efficiency rate for burrow searching to be ~57% effective, (versus detection dogs) (Kaheawa I HCP 2015 Annual Report). While exact searcher efficiency is a function of experience, terrain, and other factors, Adaptive Management triggers described below are linked to modeled outputs on the number of seabird burrows after applying a 50% searcher efficiency rate. Note that the USFWS, DLNR, or Prime Contractor may re-run the model during KSHCP review periods to use real-time data to inform Adaptive Management discussions. Thus the active burrow numbers in Table 6-5 below may be modified by the time Adaptive Management triggers are evaluated. The most up-to-date model results will always be applied before implementing Adaptive Management actions. However, updating the model results does not change the biological objectives, including the total cumulative number of fledglings that must be produced by year 30 of the KSHCP.
Table 6-5. Model-estimated number of active ‘a’o burrows at the social attraction site at five-year project intervals.

<table>
<thead>
<tr>
<th>Project Year</th>
<th>Objective</th>
<th>Model Predicted # of active burrows</th>
<th># of known active burrows assuming 50% searcher efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 5</td>
<td>2.D Successful breeding documented</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Year 10</td>
<td>2.E Cumulative upward trend in breeding</td>
<td>21</td>
<td>10</td>
</tr>
<tr>
<td>Year 15</td>
<td></td>
<td>37</td>
<td>18</td>
</tr>
<tr>
<td>Year 20</td>
<td>2.F Cumulative upward trend in breeding</td>
<td>52</td>
<td>26</td>
</tr>
<tr>
<td>Year 25</td>
<td></td>
<td>67</td>
<td>33</td>
</tr>
<tr>
<td>Year 30</td>
<td></td>
<td>80</td>
<td>40</td>
</tr>
<tr>
<td>TOTAL cumulative number of fledglings produced</td>
<td></td>
<td>923*</td>
<td></td>
</tr>
</tbody>
</table>

*This number represents the total number of fledglings produced at the mitigation site in 30 years and not the mitigation benefit (697 fledglings) which is the difference between the number of birds produced inside the fence and those that would have been produced in the absence of the conservation program.

6.10 NO SURPRISES RULE

The USFWS “No Surprises” rule (50 CFR 17.22, 17.32) provides that once an Incidental Take Permit has been issued and as long as the HCP, including its Adaptive Management program, is being properly implemented, the USFWS will not require the commitment of additional conservation or mitigation measures by the permittee (including additional land, water, or financial contribution, or additional restrictions on the use of land, water or other natural resources) beyond the level provided in the HCP, without the permittee’s consent. The State of Hawai‘i provides similar assurances in HRS § 195D-23. However, the “No Surprises” policy is not applicable to situations where authorized take levels are exceeded or the minimization or mitigation measures are not functioning to provide the conservation benefits anticipated by the HCP and consequently relied upon to meet permit issuance criteria.

No surprises assurances also do not apply to Changed Circumstances. An HCP must identify and analyze reasonable Changed Circumstances that could affect a species or geographic area during the permit term. Should such a Changed Circumstance occur, the permittee is required to implement the measures specified in the HCP to respond to the change.

Conditions that are not analyzed, and for which the “No Surprises” assurances are designed, are called Unforeseen Circumstances — those that 1) could not reasonably have been anticipated by the Applicant, USFWS, and DOFAW during the development of the HCP and 2) which result in a substantial and adverse change in the status of a Covered Species. The USFWS bears the burden
of demonstrating that Unforeseen Circumstances exist, using the best scientific and commercial data available.

6.11 CHANGED CIRCUMSTANCES

Changed Circumstances are specific foreseeable events or circumstances adversely affecting a species or geographic area covered by a habitat conservation plan. Such circumstances and planned responses are treated as part of the plan’s operating conservation program. The following section describes Changed Circumstances identified by the USFWS and DLNR that are addressed under the KSHCP.

When a Changed Circumstance is detected there will be communication between the Participants and the Wildlife Agencies within seven (7) calendar days. As soon as practicable thereafter, but no later than thirty (30) calendar days after a Changed Circumstance(s) is detected, the Participant, as appropriate, shall begin implementing the planned responses identified in Section 6.11 for the specific Changed Circumstance to the extent necessary to minimize or mitigate the adverse effects of the Changed Circumstance on Covered Species.

If the Wildlife Agencies determine that a Changed Circumstance has occurred and the Participants have not responded in accordance with Section 6.11 of the KSHCP, the Wildlife Agencies shall notify the Participants, as appropriate, and direct the Participants to implement the appropriate plan response(s) to the changed circumstance within thirty (30) calendar days after receiving such notice, and report to the Wildlife Agencies on its actions.

Under the KSHCP and in accordance with Federal and State regulation, the Participants are responsible for ensuring the minimization and mitigation of take impacts to the Covered Species to achieve the biological goals of the HCP. Planned responses would be implemented using available funds described in funding Section 7.1. Exceptions to this funding approach are noted below.

Beyond the Changed Circumstances and thresholds identified in this section, no other Changed Circumstances affecting a Covered Species or geographic area covered under the KSHCP were reasonably anticipated by the DLNR or USFWS at the time the KSHCP was prepared. Other changes in circumstances affecting a Covered Species or a covered geographic area under the KSHCP that result in a substantial and adverse change in the status of the Covered Species are considered as Unforeseen Circumstances as defined by Federal regulation (50 CFR §17.3) (see Section 6.12).

6.11.1 HURRICANES, SEVERE TROPICAL STORMS, WILDFIRES, AND OTHER NATURAL DISASTER

Severe storms and hurricanes occur periodically in the Main Hawaiian Islands (MHI). The two most recent hurricanes that directly impacted Kaua‘i were ‘Iwa in 1982 and ‘Iniki in 1992. Hurricane ‘Iniki caused widespread and devastating damage to infrastructure, property, and natural resources. Wildfire is also a threat on Kaua‘i, particularly in times of drought. The Hawai‘i Wildfire Management Organization did a Wildfire Hazard Analysis in 2013 and the area
of the KSHCP operating conservation program (Kōkeʻe State Park) was identified as a moderate to high risk in all assessment categories (Hawaiʻi Wildfire Management Association 2013)). Because Hawaiʻi’s native forest evolved with infrequent naturally occurring fires, most native plant species are not fire adapted and do not recover quickly, making the landscape vulnerable to erosion and non-native weed invasion.

Detailed storm records have been kept for the state of Hawaiʻi since 1950. In the time period from 1950-2017, hurricane and/or tropical storms have impacted Kauaʻi on average every 10 years (see Table 7-1, in Section 2.1.1). This is the basis for the planned response threshold described below. Climate change trends indicate increases in storm frequency (IPCC 2014) and changes in rainfall patterns. On that basis, hurricanes, severe storms, wildfire events, and other natural disasters can reasonably be anticipated during the 30-year term of the KSHCP and are regarded as a Changed Circumstance.

Natural disasters have potential to adversely affect the KSHCP in several ways. First, a hurricane or severe storm may pose a threat to the overall population of Covered Seabirds by killing adult birds, fledglings and chicks, destroying eggs and severely altering vegetation in breeding colonies, and damaging or destroying burrows. Second, a hurricane or severe storm may cause significant damage or destruction to Participant facilities and/or to the KSHCP operating conservation program, which may alter the effectiveness of minimization and mitigation measures and/or the amount of take requested by Participants. A hurricane or severe storm may alter the natural and human environment in areas surrounding Participant facilities and the operating conservation program in ways that increase the potential effects of those facilities or sites on the Covered Species.

Finally, fire could alter the natural environment in breeding colonies, making it unsuitable as nesting habitat, and it could cause damage to the KSHCP operating conservation program, which could alter the effectiveness of mitigation measures.

**Planned Response.** In the event of a hurricane, severe storm, or other natural disaster, the Participants, DLNR and USFWS will evaluate the extent of the damage as it pertains to the KSHCP operating conservation program and the Participants’ facilities and the resulting impacts on the Covered Species, as determined based on the best available information at that time. If determined to be necessary by USFWS and DLNR, following consultation with the Participants, damage to the conservation program (i.e. fence enclosure or social attraction equipment) may be repaired or replaced or alterations to the conservation measures may be needed to achieve the mitigation objectives of the KSHCP. The estimated cost of full fence replacement, social attraction equipment replacement and vegetation restoration is presented in Chapter 7.

Up to 2 events requiring complete replacement of the fence and social attraction equipment are considered a Changed Circumstance. Subsequent event(s) would be treated as an Unforeseen Circumstance (see Section 6.12 below).
6.11.2. Vandalism at the Mitigation Site

Over the course of the 30-year permit term, the predator proof fence, predator control equipment and/or social attraction equipment may experience vandalism. This may occur with malicious intent or at random. Fences on public lands are often perceived as a threat to full public access (e.g., for hunting and hiking) and this may draw negative attention that leads to destructive acts of vandalism.

Planned Response. In the event of vandalism the Participants, DLNR and USFWS will evaluate the extent of the damage as it pertains to the KSHCP operating conservation program and the resulting adverse effects on the Covered Species, as determined based on the best available information at that time. If determined to be necessary by USFWS and DLNR, following consultation with the Participants, damage to the mitigation site will be repaired or replaced. Additional Adaptive Management actions intended to reduce occurrences of vandalism at the mitigation site will be implemented as necessary if vandalism events occur (e.g., the installation of additional cameras and/or additional signage on the mitigation site). The estimated cost of fence repair in the event of vandalism, and the cost of additional vandalism prevention measures is less than the cost of a single full fence replacement. Up to 2 events requiring complete replacement of the fence and social attraction equipment are considered a Changed Circumstance. Subsequent event(s) would be treated as an Unforeseen Circumstance (see Section 6.12 below).

6.11.3. Listing of New Species or Delisting of a Covered Species

Species not listed as threatened or endangered under the Federal ESA or HRS Chapter 195D at the time this HCP is approved and that are not addressed as Covered Species in this HCP will not automatically be included in the Incidental Take Permits should they become listed during the term of this HCP. Over the 30-year term of the KSHCP program, it is possible that changes in the listing status of species present at Participant facilities or in the mitigation areas associated with the KSHCP could occur.

Planned Response. If a new species on Kaua‘i becomes listed under the ESA or HRS Chapter 195D, the Participants, DLNR, and USFWS will evaluate the likelihood of incidental take of a newly listed species caused by KSHCP Covered Activities.

If adverse effects to the new species or incidental take are likely, the Participants, DLNR, and USFWS will meet to discuss whether conservation measures in place can avoid incidental take, what additional measures should be put in place to address newly listed species, and whether an amendment to the HCP is required to address these issues. Unless and until a Participant’s permit is amended to authorize incidental take of new species, the Participant shall take all necessary steps to avoid incidental take of that species. The costs of minimization and mitigation measures for newly listed species are not covered by the current funding mechanisms for the KSHCP.

If the USFWS determines that Participant-covered activities or mitigation, individually or collectively, may affect the newly listed species, the USFWS will reinitiate ESA section 7
consultation on the issuance of ITPs for Participant plans. If the consultation determines that any such activities are likely to jeopardize the newly listed species, the USFWS will provide reasonable and prudent alternatives (RPAs), if any, to the Participant(s) to avoid such an outcome. Failure to implement RPAs could result in revocation of the permit(s).

If any of the Covered Species become delisted over the term of the KSHCP, measures for that species will continue in accordance with the KSHCP, but the Participants may initiate discussions with the USFWS and DLNR to determine if such actions may be discontinued.

6.11.4. CRITICAL HABITAT DESIGNATION
The Covered Species do not currently have designated Critical Habitat. If the USFWS designates Critical Habitat, and such Critical Habitat may be adversely affected by the activities covered in the KSHCP, such an occurrence is regarded as a Changed Circumstance.

Planned Response. If the USFWS determines the covered activities or mitigation may adversely affect Critical Habitat, it will reinitiate consultation on the issuance of ITPs for Participant plans to determine if the covered, minimization and mitigation activities under the KSHCP, individually or cumulatively, would be likely to destroy or adversely modify critical habitat. If so, the USFWS shall develop reasonable and prudent alternatives to the KSHCP and/or Participant plans, in consultation with the Participants, to avoid this outcome that will be implemented by the Participants as necessary.

6.11.5. GLOBAL CLIMATE CHANGE
The vast body of scientific evidence supports the concept that warming of global temperatures is occurring and will continue into the future and that a contributing factor is the release of greenhouse gases from human-caused actions (IPCC 2014). Predicted impacts of climate change include changes in ocean temperatures and acidity levels, and the spread of invasive organisms (IPCC 2014). The impact and timing of climate change is uncertain, but is anticipated to impact the Covered Seabirds in at least two ways:

1. Ocean acidification and increased ocean temperatures could result in changes to seabird prey base (Kroeker et al. 2013) impacting prey abundance and foraging; and
2. Increasing temperatures could increase the spread of disease or invasive species that either impact Covered Seabirds directly or negatively impact seabird breeding habitat (Oro 2014).

Appendix B: Covered Species Biological Details provides more detailed information on the potential impacts of climate change on the Covered Seabirds.

Planned Response. If the USFWS and DLNR determine that climate change is negatively impacting anticipated benefits of the conservation measures of the KSHCP, the USFWS and DLNR shall evaluate the extent of the impact and the resulting effects on KSHCP mitigation measures, based on the best available information at that time. As determined necessary by DLNR and USFWS, following consultation with the Participants, adjustments to conservation measures will be implemented to achieve mitigation benefits committed to by the Participants.
under the KSHCP program. Climate change impacts will be considered a Changed Circumstance only if impacts are directly affecting the KSHCP operating conservation program. For example, if climate change is impacting habitat conditions at the mitigation site, this could be addressed by altering vegetation management.

6.11.6. INVASIVE SPECIES
Invasive species of both plants and animals have had, and will continue to have, a detrimental effect on the Covered Species and their habitat.

Introduction of a New Predator Species. Predation by alien mammalian species has been shown to constitute a very substantial threat to the Covered Species on Kaua‘i, and other, non-mammalian, predators also have had significant impacts to seabirds in the MHI. The possibility exists that the small Asian mongoose (*Herpestes javanicus*) will become established on Kaua‘i during the term of the KSHCP, which would be highly likely to have a negative impact on the overall populations of Covered Species. Several individuals have been caught on Kaua‘i in recent years and ‘credible sightings’ are reported to the Kaua‘i Invasive Species Committee annually from multiple locations on the island. Other potential predators on the Covered Species such as the brown tree snake (*Boiga irregularus*), a new species of rodent or a harmful insect such as yellow crazy ants (*Anopolepis gracilipes*) may be introduced during the 30-year permit term as well.

Alien plants have displaced native vegetation from former breeding colony areas, reducing or eliminating the suitability of the area for Covered Species. In addition, invasive species of insects, fungus, nematodes, mites and other plant pests may be introduced, which may adversely affect native species, and seabird habitat suitability within the mitigation site over the term of the HCP.

In general, the threat of new invasive species is heightened by the challenge of maintaining biosecurity on imports into the MHI. The likelihood that invasive species will be introduced or increase during the term of the KSHCP is sufficient to warrant treating this species introduction or increase as a Changed Circumstance.

Planned Response. Proposed monitoring at the KSHCP mitigation site, including predator control, vegetation and burrow monitoring (see Section 6.8.2) should be sufficient to provide early detection of any new invasive plants or animals at the site. In the case of introduction of a new mammalian predator (such as a mongoose), the predator proof fence at the mitigation site would prevent access to the social attraction site. Outside of the predator proof fence, within the geographic area where feral cat trapping will occur, mongoose will be removed by using existing cat traps. In the event that other types of invasive species (e.g., insects, amphibians, reptiles, non-native plants, etc.) impact the KSHCP operating conservation program, necessary management actions would be evaluated and implemented after discussion with the Participants. These include but are not limited to trapping insects, disinfecting artificial burrows within the social attraction site, or trapping snakes where seabird burrows occur along cat trap lines outside of the enclosure. The estimated cost of these adaptive management solutions to
additional invasive species are expected to be minimal and within the current KSHCP operations budget.

In the event habitat enhancement and/or vegetation management measures at the KSHCP operating conservation program sites are compromised by new and/or increased populations of invasive plant or insect species, vegetation management activities (including increased monitoring) may be modified. The USFWS and DLNR will determine, after discussion with Participants, that such a response is necessary to achieve the mitigation objectives of the KSHCP.

6.11.7. DISEASE OUTBREAKS IN A COVERED SPECIES
Hawaiian endemic species evolved in the absence of many pathogens. As a result, their lack of resistance to some diseases may have played an important role in their decline. The estimated risk to the Covered Species of disease outbreaks varies by species or is unknown. Among the `a`o populations, fledglings have been found with mild symptoms of avian pox (Ainley et al. 1997b) and avian malaria (Warner, 1986; A Raine, 2017, pers. comm.). The likelihood that the threat from disease will occur during the term of the KSHCP is sufficient to warrant treating this threat as a Changed Circumstance.

Planned Response. Conservation measures may be implemented if USFWS and DLNR determine, after discussion with Participants, that it is necessary to respond to the increased prevalence of disease and its threat to the KSHCP operating program. For example, mosquito trapping would be evaluated and implemented should avian malaria impact populations of Covered Seabirds breeding in the social attraction enclosure or along trap lines. The estimated cost of these adaptive management solutions to disease are expected to be minimal and within the current operations budget.

6.11.8. CHANGES IN SURVIVAL OF BIRDS REHABILITATED AND RELEASED
The SOS program is the anticipated means to achieve the KSHCP objective of recovering, rehabilitating and releasing all downed birds found at Participant facilities (see Section 5.3.4). Given the 30-year term of the KSHCP, it is reasonable to anticipate that the SOS Program may not be available to serve this function during the entire term of the KSHCP, which warrants treating this as a Changed Circumstance.

It is also foreseeable that, during the course of the KSHCP, new information will become available on the survival of birds released through the SOS Program or any replacement program. The KSHCP, using the best available science, assumes that all birds evaluated and released through the SOS program in a timely manner will survive at the same rate as wild fledglings not recovered and released through SOS (see Section 4.1.3 for details). It is foreseeable that new data will become available that alters this assumption on SOS survival. In addition, if the SOS program is no longer available as a means to achieve the KSHCP minimization objective of recovering, evaluating and releasing downed seabirds, survival of released birds may be different under the care of separate veterinarians.
If the survival of recovered and released downed seabirds changes, this will impact the ratio of lethal versus non-lethal take in the KSHCP. If released seabirds do not survive at the same rate as wild birds that do not experience fallout and subsequent release, then the changed ratio may require a response as explained below.

Planned Response if SOS Program is no Longer Available: The KSHCP intends to rehabilitate and release downed seabirds that are recovered by Participants via the SOS Program. The SOS Program provides expertise, cost effective rehabilitation, established aid stations and more. However, the KSHCP provides for the contingency that the SOS Program may not be available for the life of the program by collecting funds adequate to provide the required services (rehabilitation and release of downed seabirds) independent of the continued existence of the SOS Program. If necessary, the Participants would use a certified veterinarian to handle and rehabilitate downed seabirds from the Participants’ premises. Each Participant would be responsible for arranging for the required services for its downed seabirds. The KSHCP funds would not be necessary to meet this contingency.

Planned Response Based on Changes in Survival: If information shows different survival of recovered and released birds than is assumed in the current KSHCP, this information could result in higher or lower take levels. If this results in higher take levels, individual Participants would need to determine whether this higher level is likely to exceed the amount of take authorized by their permit and, if so, may apply for a permit amendment. If the increased lethal take can be accommodated under the current KSHCP, the process for re-evaluating costs is described in Section 6.5. If it cannot be accommodated under the current KSHCP, Participants or an individual Participant may elect to initiate a Major Amendment pursuant to Section 6.13.2. Each participant is responsible to address its additional minimization and mitigation as necessary.

If the information results in a lower take level for a Participant, the Participant may request to amend its permit pursuant to Section 6.5.

6.12 UNFORESEEN CIRCUMSTANCES

Unforeseen circumstances are defined by Federal regulation (50 CFR §17.3), this refers to circumstances affecting a species or geographic area covered by the HCP that cannot be reasonably anticipated by the Participant or the wildlife agencies. In the event that USFWS or DLNR makes a finding that unforeseen circumstances have arisen during the term of the KSHCP, the USFWS and DLNR will notify the Prime Contractor and Participants in writing. If it is demonstrated by USFWS and DLNR that unforeseen circumstances exist during the permit term, and additional conservation measures are recommended, the Prime Contractor and the Participants will have the opportunity to evaluate the feasibility of implementing any measures recommended by USFWS and DLNR and propose other conservation measures.

Provided the KSHCP is being properly implemented, additional conservation measures are limited in that the USFWS and DLNR:
1) shall neither require the commitment of additional land, water, or financial compensation by Participants without Participants’ consent nor shall they impose additional restrictions on the use of land, water, or other natural resources otherwise available for use by Participants under the original terms of the KSHCP;
2) shall have the burden of demonstrating that such unforeseen circumstances exist, using the best scientific and commercial data available. Their findings must be clearly documented and based upon reliable technical information; and
3) shall not require additional mitigation than originally agreed (i.e. may not increase the number of birds required to mitigate for lethal take) for a species where the terms of the properly functioning KSHCP were designed to provide an overall net benefit for that species and contained measurable criteria for the biological success of the KSHCP, which have been or are being met.

Notwithstanding these provisions, an ITP may be revoked if continuation without additional mitigation would be inconsistent with the requirement that the incidental taking not appreciably reduce the likelihood of the survival and recovery of the species in the wild (50 C.F.R. §§ 17.22(b)(8), 17.32(b)(8).

6.13 CHANGES AND AMENDMENTS TO THE KSHCP
There are two types of changes which may be made to the KSHCP; Minor Amendments and Major Amendments. All revisions and amendments will be processed in accordance with all applicable legal requirements.

6.13.1 MINOR AMENDMENTS
Minor Amendments are changes to the KSHCP provided for under the operating conservation program, including Adaptive Management changes and responses to Changed Circumstances. They include revisions that do not materially modify the scope or nature of effects on the Covered Species, do not diminish the level or means of mitigation, or do not increase the take threshold of the HCP. Minor Amendments may include, but are not limited to, the following:

- Correction of any maps or exhibits or documents to correct errors or spelling;
- Routine administrative revisions;
- Modifying reporting protocols or formats for Annual Reports;
- Minor changes to monitoring or reporting protocols;
- Minor changes to the size, design, and management of the mitigation site to enhance the potential for success;
- Minor changes to the schedule of mitigation milestones;
- Any other modifications to the KSHCP that are consistent with its biological goals and objectives that will not:
  - result in operations under the KSHCP being materially different from those analyzed in connection with the KSHCP as approved,
  - have adverse impacts on the environment that are new or materially different from those analyzed in connection with the KSHCP as approved,
result in take of Covered Species not analyzed in connection with the KSHCP as approved.

Such Minor Amendments do not alter the terms of the incidental take permit or incidental take license. Upon the written request by the Participants, the USFWS and DLNR may approve Minor Amendments to the HCP.

6.13.2 MAJOR AMENDMENTS
Amendments that substantively alter the total take of the KSHCP, the term of the KSHCP, or the mitigation provided to compensate for take, would be considered a Major Amendment.

Examples include but are not limited to the following:
- Mitigating for take of honu;
- Adding a new species to the list of Covered Species contained in the KSHCP;
- Abandoning the predator proof fence and/or associated barn owl and feral cat control, and redirecting mitigation funding to a new project;
- Extending the term of the KSHCP and associated incidental take permits beyond the original term;
- Additional take requests that would exceed the maximum amount of take in the KSHCP;
- A reduction in initial authorized take amount of greater than 50%;
- Changes to the Covered Activities which were not addressed in the KSHCP as originally approved, and which otherwise do not meet the criteria for a Minor Amendment.
- Changes to the mitigation which were not addressed in the KSHCP as originally approved, and which otherwise do not meet the criteria for a Minor Amendment.
- Changes to take levels due to survival of downed seabirds rehabilitated and released through the SOS Program or certified veterinarian.

A Major Amendment requires submittal to USFWS and DLNR of a written application and implementation of all permit processing procedures applicable to an original incidental take permit. The specific documentation required to comply with the Federal ESA, HRS Chapter 195D, the National Environmental Policy Act, and HRS Chapter 343 may vary based on the nature of the amendment.

Costs for submitting and processing a Major Amendment would be paid by relevant Participant(s). For example, if only one Participant needed take coverage for honu, or a new species, they would be responsible for associated costs. In contrast, an amendment required for multiple Participants may result in adjustments to shared costs.

6.14 AMENDMENTS TO PERMITS
Any increase or material change to minimization plans or take requests would require an amendment to the permit according to applicable regulations at that time. Permit changes may need to be made to reflect amendments to the KSHCP as determined by the USFWS and DLNR. The USFWS is not required to approve amendments made to the incidental take license by
DLNR, and DLNR is not required to approve amendments made to the incidental take permit issued by USFWS.

6.15 SUSPENSION/REVOCATION
USFWS and DLNR may suspend or revoke a Participant’s permit if the KSHCP Participant is not in compliance with the terms of its permit/license (which incorporates the KSHCP and PIP) or as otherwise provided for by State or Federal law. Suspension or revocation of the permit/license shall be done in accordance with applicable Federal or State law and regulations.

6.16 PERMIT TRANSFER
In the event of sale or transfer of ownership of facilities covered under the KSCHP during the term of the permits, the permit/license may be transferrable to the new owners. Participants must notify USFWS and DLNR in advance of the sale or transfer of ownership for information on the requirements for transfer in effect at that time.

6.17 KSHCP EXTENSION AND RENEWAL OF PERMITS
At the end of the 30-year duration, the KSHCP may be extended and permits renewed under certain circumstances and to the extent permitted by law. Two years prior to the end of the KSHCP, interested Participants, DLNR and USFWS will meet to gauge the extent of interest in extending the KSHCP and discuss whether biological circumstances (e.g. threats and conservation needs) and the nature of effects to Covered Species make the KSHCP still the appropriate vehicle to mitigate incidental take. If so, the Prime Contractor will work with the Participants and the wildlife agencies to make any necessary changes to the KSHCP. Participants may apply for renewal of their permits in accordance with State and Federal regulations in effect at that time. (Federal regulations governing permit renewal are currently codified at 50 C.F.R. 13.22.)
7. **FUNDING**

The KSHCP consists of a unique payment scheme and funding assurance approach. The combined funding provided by multiple Participants (entities issued with incidental take authorization) enables the Plan to take advantage of economies of scale to conduct conservation actions and allows for cost-sharing of some project components.

Cost sharing is achieved by dividing the total costs among the KSHCP Participants in accordance with the amount of take requested per Participant. With a defined mitigation project and identified Plan costs, the cost per Participant becomes a function of how many Applicants join the KSHCP, how much total, combined take will be authorized by the regulatory wildlife agencies, and the amount of take for a given Participant. Table 7-1 provides a summary list of cost categories of the KSHCP, and which are shared. Costs that are specific to individual Participants and Participant facilities are not shared costs.

**Table 7-1. Cost components of the KSHCP and cost sharing.**

<table>
<thead>
<tr>
<th>Cost Item</th>
<th>Payment</th>
<th>Description</th>
<th>Shared</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Project Administration</strong></td>
<td>Paid to KSHCP</td>
<td>Administration and coordination of the KSHCP</td>
<td>Shared</td>
</tr>
<tr>
<td><strong>Mitigation through predator proof fence, seabird social attraction, associated barn owl and feral cat control &amp; effectiveness monitoring</strong></td>
<td>Paid to KSHCP</td>
<td>Build fence, implement social attraction, predator control and associated actions and measure results</td>
<td>Shared</td>
</tr>
<tr>
<td><strong>Changed Circumstances/Adaptive Management fund</strong></td>
<td>Paid to KSHCP Reserve Account</td>
<td>To fund Changed Circumstances, including Adaptive Management measures that exceed operating budget</td>
<td>Shared</td>
</tr>
<tr>
<td><strong>Financial Assurances</strong></td>
<td>Paid to KSHCP Reserve Account</td>
<td>To cover costs for remaining Participants if other withdraws or fails to make required payments</td>
<td>Shared</td>
</tr>
<tr>
<td><strong>State compliance &amp; annual review</strong></td>
<td>Paid to DLNR by Participants</td>
<td>Conduct annual review and HCP compliance</td>
<td>Shared</td>
</tr>
<tr>
<td><strong>Avoidance and minimization measures</strong></td>
<td>Costs incurred by each Participant but not paid to KSHCP accounts</td>
<td>Measures to reduce the effects of light attraction and reduce on-site predation</td>
<td>Not shared</td>
</tr>
<tr>
<td><strong>On-site take monitoring</strong></td>
<td>Costs incurred by each Participant but not paid to KSHCP accounts</td>
<td>Participant must provide trained monitors to search property for impacted wildlife and report the results</td>
<td>Not shared</td>
</tr>
<tr>
<td><strong>Beach honu nest monitoring and light avoidance</strong></td>
<td>Costs incurred by each Participant but not paid to KSHCP accounts</td>
<td>Measures to prevent honu disorientation at nests</td>
<td>Not shared</td>
</tr>
</tbody>
</table>
7.1 SHARED COST COMPONENTS

Section 10(a)(2)(B)(iii) of the ESA requires that “the Applicant will ensure that adequate funding for the plan will be provided.” This issuance criterion requires that the Applicant detail the funding that will be available for all shared and facility specific funding components of the KSHCP.

HRS Chapter 195D states that the Applicant shall provide adequate funding for the plan. This may be accomplished by “depositing a sum of money in the endangered species trust fund created by Section 195D-31, or provid[ing] other means approved by the board....” HRS § 195D-4(g)(3). Similarly, each HCP shall also “identify ... an adequate funding source to ensure that the actions or measures, including monitoring, are undertaken in accordance with the schedule.” HRS § 195D-21(b)(2)(D).

In connection with the KSHCP, the National Fish and Wildlife Foundation (“NFWF”) will establish two accounts to receive, manage, and disburse certain funds to be deposited by Participants in the KSHCP for purposes of the Participants’ implementation of the 30-year KSHCP. The KSHCP Conservation Measures Implementation Funding Account will receive the Annual Payments, adjusted for inflation, paid by Participants under Section 7.1, below. The KSHCP Reserve Account will receive the Financial Assurances Payments and the Changed Circumstances/Adaptive Management Payments paid by the Participants under Section 7.1, below.

The proposed funding required in any given year of Plan implementation is derived from cost estimates in Appendix G for implementing conservation actions as specified in Chapter 5 and Appendix A: Kahuama’a Seabird Preserve Management Plan.

Upon issuance of the ITP and ITL, each Participant will, within 30 days make payments indicated below as due for year one. Initial payments must be made before the ITP and ITL can become effective. Thereafter, payments must be made on or before the anniversary of the effective date of either the ITP or ITL, whichever occurs earlier. NFWF will send an email confirmation of receipt of payments to the Payor, USFWS and DLNR and Participants.

Payment descriptions are as follows (also see Table 7.2):

**Annual payments**

Annual Payments will be used for the implementation of the mitigation measures on an annual basis. These funds will be paid to the KSHCP Conservation Measures Implementing Funding Account. The first year’s collective payment will be greater than the following years’ payments to provide sufficient funds for construction of the fence, predator removal, and social attraction site equipment. The first year collective payment will be $643,884.

A Participant shall have the right, but not the obligation, to pre-pay its annual payments for the remainder of the KSHCP term or a portion thereof, accounting for inflation.
Reserve Funds for Financial Assurance and Changed Circumstances/Adaptive Management

In addition to the annual payments, Participants will make payments to the KSHCP Reserve Account to 1) provide Financial Assurances (three years of annual payments) and 2) provide a fund for Changed Circumstances and Adaptive Management (the cost of one complete fence and social attraction equipment replacement).

First, to provide financial assurances, Participants will collectively pay three times the anticipated annual payments after Year One. As shown in Table 7-2, the collective anticipated annual payment after Year One is approximately $200,000. Therefore, the Financial Assurances payment will be $600,000. This financial assurances reserve fund is available to be drawn upon by the other Participants if a Participant does not make its annual payment or elects to withdraw from the KSHCP. This will allow the remaining Participants to cover the mitigation costs that the delinquent or withdrawing participant would have paid. The collective financial assurances payment will be made to the KSHCP Reserve Fund with half ($300,000) to be paid in Year 1 and the other half ($300,000) to be paid in Year 2.

Second, the Participants will fund a reserve to provide for Changed Circumstances and Adaptive Management measures that exceed the annual payments. As provided in Section 6.11, up to 2 events requiring complete replacement of the fence and social attraction equipment is considered a Changed Circumstance. The Reserve Fund shall be funded initially in the amount of one complete fence and social attraction equipment replacement. This collective payment will be $225,000. These funds may be used if there are Changed Circumstances or Adaptive Management measures that require the expenditure of funds beyond those available from the annual payments. This collective payment will be made in year 2 (as the first year cost includes a cushion for increased costs in year 1). The Reserve Fund shall be replenished following withdrawals so that there are sufficient funds to pay for one complete replacement of the fence and social attraction equipment, provided however that the Changed Circumstances reserve, as replenished, shall not exceed the cost of up to 2 events requiring complete replacement of the fence and social attraction equipment, as provided in Section 6.11. Notwithstanding any limits on replenishment of the Changed Circumstances/Adaptive Management Reserve Fund, the Participants remain responsible for meeting the biological goals of the KSHCP (see Adaptive Management Process in Chapter 6).

No later than Year 28 of the KSHCP, the Participants will determine whether they wish to seek an amendment to extend the term of the KSHCP. If the Participants conclude they will seek an amendment to extend, the annual payments shall be made and the Reserve Fund maintained pending consideration of the amendment. If the Participants conclude they will not seek an amendment to extend, they will advise the USFWS and DLNR. At the end of Year 28, one year of the three years of Financial Assurance funds in the KSHCP Reserve Account ($200,000) shall be transferred to the KSHCP Conservation Measures Implementing Fund and shall offset the annual payment for Year 29 to the extent of the funds transferred. At the end of Year 29 of the KSHCP, one year of the three years of Financial Assurance funds in the KSHCP Reserve Account ($200,000) shall be transferred to the KSHCP Conservation Measures Implementing Fund and shall offset the annual payment for year 30 to the extent of the funds transferred. At the end
of the original term of the HCP, or any sooner termination, any interest accrued and remaining monies in both the KSHCP Reserve Account and the KSHCP Conservation Measures Implementing Fund will be paid to the Participants remaining in the HCP based on their proportionate share of the authorized take.

**Inflation** – Participants will work with the Prime Contractor to manage costs of implementation of the KSHCP. The budget includes inflation at three percent (3%) per annum for the annual payments. Both the KSHCP Conservation Measures Implementation Funding Account and the KSHCP Reserve Account will be invested by NFWF in one or more investment portfolios or an interest-bearing account maintained by NFWF. The Changed Circumstances/Adaptive Management funds will be replenished following withdrawals so that there are sufficient funds in then-current dollars to pay for one complete replacement of the fence and social attraction equipment, provided however that the Changed Circumstances reserve, as replenished, shall not exceed the cost of up to 2 such events, as provided in Section 6.11.

For the Financial Assurances portion of the Reserve Account, the Participants will have funded an initial three years of payments into a NFWF investment account. In the event of an early withdrawal of a Participant, the remaining Participants will replenish their individual pre-withdrawal shares for inflation, taking into account investment income, so that their three years of Financial Assurance payments are in then-current dollars.

**Table 7-2: Schematic of types of payments needed for KSHCP funding, and which payments will required in specific years.**

<table>
<thead>
<tr>
<th></th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Payment</td>
<td>$643,885</td>
<td>$181,094</td>
<td>$186,227</td>
<td>$191,514</td>
<td>$196,959</td>
</tr>
<tr>
<td>Changed Circumstances</td>
<td>0</td>
<td>$225,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Financial Assurances</td>
<td>$300,000</td>
<td>$300,000</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The Prime Contractor shall have the right, but not the obligation, to accept payment in kind for materials or labor needed to implement the KSHCP from a Participant in satisfaction of its annual payment(s). The Participants shall have the right, but not the obligation, to provide a letter of credit in lieu of the Financial Assurances payment, provided that the Letter of Credit shall be made payable to NFWF or the KSHCP accounts, as directed by NFWF.

### 7.2 NON-SHARED COST COMPONENTS

The minimization measures described in individual PIPs will be performed by each individual Participant. The measures consist of lighting minimization; recovery of downed seabirds and their transportation to SOS or another appropriate facility; predator control at facilities; outreach and worker training; and honu actions (see Chapter 9). These measures will be
implemented by the Participants within one year of Implementing Agreements (IA) and the issuance of the ITP and ITL.

Each Non-Governmental Participant will:

- Provide the estimated cost of its non-shared minimization and other measures in its PIP, along with an explanation as to how the Participant plans to fund these costs. Unless the Participant is going to provide a funding guarantee such as an irrevocable letter of credit, the Participant should provide sufficient information to show that it has the financial ability to fund these costs, i.e., that it is financially solvent and capable of providing the necessary funding.
- Warrant that it has, and will expend, the operating funds necessary to continue its minimization obligations.
- Agree to promptly notify the Prime Contractor and regulatory wildlife agencies (USFWS and DLNR) of any material change in its financial ability to fulfill its ongoing minimization obligations.
- Certify in its Annual Report to the Prime Contractor that it has, and will continue to expend, the operating funds necessary to continue its minimization obligations throughout the term of the ITP and ITL.

Each Governmental Participant will:

- Provide the estimated cost of its non-shared minimization and other measures in its PIP, along with an explanation as to how the Governmental Participant plans to fund those costs. If the Governmental Participant relies on annual appropriations for its funding assurances, the effective date of its incidental take authorization and the incidental take authorization for each year thereafter will be contingent on the Governmental Participant certifying to the agencies that funds have been appropriated for that year and will be expended. For this reason, the agencies recommend that Governmental Participants request appropriations for any non-shared measures not included in the normal operating budget in their next respective biennium budgets and as a recurring annual expense thereafter.
- Agree to promptly notify the Prime Contractor and regulatory agencies (USFWS and DLNR) if the funds requested to carry out its obligation under the KSHCP are not authorized.
- Certify in its Annual Report to the Prime Contractor that it will request in its annual budget and if approved expend, the operating funds necessary to continue its minimization obligations throughout the term of the ITP and ITL.

7.3 READJUSTING COST PER TAKE

7.3.1 LATE ENTRY TO THE KSHCP
The KSHCP is designed to accommodate new Applicants, or Participant requests for additional incidental take amounts annually up to the maximum level authorized by the wildlife agencies
in the form of new or amended permits (see Section 6.3). This may result in a reduction to cost per take estimates. The cost readjustments described below will occur if the additional incidental take request does not exceed the maximum amount analyzed in the KSHCP and is authorized by the wildlife agencies. (Note: If the maximum amount of take authorized in the KSHCP is exceeded, this will trigger a Major Amendment so is not discussed further here, see Section 6.13.2).

The fundamental issue for any late entries to the KSHCP, in terms of funding, is distributing costs equitably while accounting for the higher “set up” costs paid by the initial Participants. Additional incidental take requests will generally fall into three categories:

1. Results of Take Monitoring demonstrate the need for existing Participants to request additional incidental take;
2. Additional new Applicants who have been incurring ongoing take since the KSHCP initiation and are approved to join the KSHCP; or
3. Additional Applicants who have not incurred take in the past (e.g. opening a new facility) are approved to join the KSHCP.

In the case of category 1, the Participant will have already contributed towards the initial set up costs. The overall cost per take will reduce for all Participants to reflect the increase in overall take authorization within the planned-for mitigation.

In the case of Category 2, the new Applicant will be required to pay for a portion of the set up costs (relative to the additional incidental take request) plus a portion of the annual implementation costs since the first year of the KSHCP, based on its proportional amount of incidental take. This is because the new Participant has been incurring take during this time period and because it is not equitable for a new entrant to pay only for the maintenance of infrastructure built and paid for by others. The set up costs include but are not limited to the cost of fence construction, predator control and social attraction site equipment that the initial Participants funded in the first years of the KSHCP. The annual fee for the Participants will be reduced as a result of the allocation of a portion of the set up costs as well as a reduced annual payment given the increase in authorized take.

In the case of Category 3, the new Participant will be required to pay a portion of the set up costs, but will begin paying their share of annual implementation costs at the time of joining, and for the remainder of the permit term. It is not equitable for a new entrant to pay only for the maintenance of infrastructure built and paid for by others. The set up costs include but are not limited to the cost of fence construction, predator control and social attraction site equipment that the initial Participants funded in the first years of the KSHCP. The annual fee for the Participants will be reduced as a result of the allocation of a portion of the set up costs as well as reduced annual costs given the increase in authorized take.

Late Participants (categories 2 & 3) will be required to make an initial payment consisting of:
(1) a proportional contribution towards Year 1 set up costs ($600,000) and (if applicable) proportional contribution towards annual implementation costs for missed years, both adjusted for inflation;
(2) a proportional contribution toward the $600,000 Financial Assurances Payment, as adjusted for inflation to reflect three years of annual payments in then-current dollars; and
(3) a proportional contribution towards the $225,000 Changed Circumstance/Adaptive Management payment, as adjusted for inflation to reflect the cost of one complete fence and social attraction equipment replacement. See Section 7.1 for details on these payments and their function in the KSHCP funding scheme.

The term of the KSHCP shall not be extended by the addition of Participants.

In all cases, the overall costs per take should be reduced for the initial group of Participants, and their 30 year costs will be adjusted to reflect this. The resulting reduction in annual costs and set-up costs for the initial Participants will be re-calculated to reflect a new annual cost per take, and applied retroactively to credit initial Participants for payments at the higher rate. Participants will subsequently pay a lower annual rate.

### 7.3.2 Early Withdrawal from the KSHCP

A Participant may withdraw from the KSHCP before the conclusion of its permit term if it discontinues its Covered Activities or otherwise surrenders its permit in accordance with applicable law. Upon withdrawal from the KSHCP, the Participant shall forfeit the Financial Assurances Payment and the Changed Circumstances payment, except as provided below. Participants that withdraw early will have paid annual fees for an annual incidental take estimate averaged over the 30 year term, and will not be credited if their incidental take did not reach the annual take estimates.

For example, if a Participant withdraws at Year 10, and the initial take request was 2 birds/year, even if the Participant’s monitoring has not documented incidental take of 20 birds, the fees paid in years 1-10 will be retained to pay for sufficient mitigation offset. However, if incidental take exceeded annualized take estimates, the withdrawing Participant will be required to pay additional fees as determined by DLNR and USFWS, with assistance from the Prime Contractor.

Where there is a new Participant with take to replace the take of the withdrawing Participant in whole or in part, the new Participant will pay into the KSHCP Reserve Account its share of the Financial Assurances and Changed Circumstances/Adaptive Management payments, and the withdrawing Participant will receive its pre-payments or a portion thereof.

In the case of withdrawal of a Participant or Participants or Participant reductions in take request, the wildlife agencies will work with the Participants to enroll additional Participants or provide mitigation for other programs or entities that require mitigation for seabird take. The Prime Contractor will work with the wildlife agencies to determine whether mitigation can be scaled to reflect the reduced take. If these strategies do not work, all shared costs must be
collected from remaining Participants, provided however that the Participants may elect to initiate a Major Amendment if there is a reduction of greater than 10% of the initial authorized take (see Section 6.13.2).

A change in ownership shall not constitute an Early Withdrawal if the permit is transferred to the new owner (see Section 6.16). The Federal permit may be transferred in accordance with regulations in existence at that time (currently codified at 50 C.F.R. 13.25). In the event of a change of ownership of the Facility, the Implementing Agreement, the ITP and the ITL shall be transferred to the new owner. There shall be no change to the annual payment in the event of a change of ownership. The amounts paid to the KSHCP accounts, including the Financial Assurances and Changed Circumstances/Adaptive Management payments, shall be transferred and credited to the new owner.

7.4 PERMIT SUSPENSION OR REVOCATION

In the case of Participant’s permit suspension or revocation, the costs and obligations of the other Participants in the KSHCP will be adjusted in the same manner as Early Withdrawal.

7.5 MITIGATION CREDIT

The KSHCP is a comprehensive plan that includes measures to avoid, minimize and mitigate for incidental take of Covered Seabirds caused by light attraction. The plan is structured to achieve the Goals and Objectives outlined in Table 5-1. The following section describes how mitigation credit is allocated based on successful completion of these objectives. The chronological sequence of plan objectives with substantive mitigation targets provides a phased approach towards accruing mitigation credit. This approach will enable the wildlife agencies and the Prime Contractor to determine the degree to which the KSHCP goals and objectives are achieved by the Participants over time.

The relationship of KSHCP objectives achieved and mitigation credit allotted is set by completion of biological performance targets, which in turn is tied to providing required annual funds. Year one has higher costs as the project is set up (8% of total 30-year project cost). As the project then moves into long-term maintenance, biosecurity and monitoring, the annual cost stabilizes, and each year 3% of the total project budget is spent.

Table 7-3. Proportion of total proposed KSHCP costs to be spent by project year.

<table>
<thead>
<tr>
<th>Project Year</th>
<th>Percentage of Total Project Cost*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>7.7%</td>
</tr>
<tr>
<td>2</td>
<td>3.3%</td>
</tr>
<tr>
<td>3-30</td>
<td>3.3%</td>
</tr>
</tbody>
</table>

*Total project cost includes funding of infrastructure, predator removal and biosecurity, biological and compliance monitoring and the KSHCP Prime Contractor and is presented in Appendix G: KSHCP Budget Details. Total project cost does not include funds collected for Changed Circumstances/Adaptive Management or Financial Assurances.
For each of the objectives associated with the mitigation project, the cumulative financial investment is reflected in the mitigation credit (Table 7-3). For example, if Objective 2.C is achieved by the end of Year 4, 17% of the total take of each Participant has now been successfully mitigated (8% in Year 1, 3% in each of Years 2, 3, & 4). If Objective 2.D is achieved by Year 7, 26% of the total take for each Participant has been mitigated. These numbers are derived from cumulative years of contributing 3% per year towards total project costs. Under this approach, a total mitigation credit equaling 100% can be achieved by the end of the 30-year permit term if all KSHCP goals and objectives are met in a timely manner.

Calculating the accrued mitigation credit at annual intervals is important for multiple reasons. Firstly, this helps determine the level of progress towards KSHCP goals and objectives. Secondly, if through the Adaptive Management process that decision on whether the mitigation project must be abandoned and funding shifted to an alternate mitigation project. This also provides a defined metric, based on which biological objectives were successfully met, for determining how much take has already been successfully mitigated (see Table 7-4). Criteria for project abandonment include inability to meet multiple project objectives on the scheduled timeline, even with the implementation of Adaptive Management measures.

Successful completion is a requirement for all KSHCP Participants (see Section 5.2) for all of the objectives associated with Biological Goal 1. Thus there is no specific mitigation credit associated with achieving these objectives, as it is necessary for permit compliance.

The level of mitigation credit allotted for achieving specific objectives is detailed in Table 7-4 for the objectives associated with Goal 2.
<table>
<thead>
<tr>
<th>Biological Goals</th>
<th>Biological Objectives</th>
<th>Mitigation Credit Standard</th>
</tr>
</thead>
</table>
| Goal 2: Mitigate authorized take impacts of Covered Seabirds by enhancing, protecting and managing suitable seabird breeding habitat on Kaua‘i to facilitate successful production of fledglings at a level that over the 30-year term of the Plan offsets or exceeds the impacts of take caused by Covered Activities on the production of fledglings in the wild. | 2.A. Construct a predator-proof fence and install social attraction equipment (nest boxes, speakers) within the fenced area at mitigation site in Year 1 of KSHCP implementation.  
2.B. Remove predators from within the fenced enclosure with monitoring confirmation of their absence, and activation of social attraction equipment by Year 2; predator eradication within fenced enclosure maintained for the life of project.  
2.C. Ground activity by Covered Seabirds documented at the mitigation site by Year 4 of KSHCP implementation.  
2.D. Breeding activity by Covered Seabirds documented at the mitigation site by Years 5-7 of KSHCP implementation.  
2.E. Cumulative upward trend in Covered Seabird breeding documented at the mitigation site by Year 10 of KSHCP implementation.  
2.F. Continued cumulative upward trend in Covered Seabird breeding documented at the mitigation site by Year 20 of KSHCP implementation.  
2.G. Maintain high quality seabird habitat at the mitigation site by removing habitat modifying invasive plants in Year 1 and annually throughout the 30-year duration of the KSHCP.  
2.H Protect nesting birds inside mitigation fence and in nearby source colonies by implementing predator control of 1) barn owls within the area surrounding the fenced enclosure and the Kalalau Valley, and 2) feral cats at ingress points to source colonies in the Kalalau Valley, beginning in year 1 and annually throughout the 30-year duration of the KSHCP.  
Achieving this objective results in 17.5% of mitigation credit.  
Achieving this objective results in 20.8-27.4% of mitigation credit.  
Achieving this objective results in 37.2% of mitigation credit.  
Achieving this objective results in 70% of mitigation credit.  

The goal of using project tasks (Objectives 2.A-2.B) and biological targets (Objectives 2.C-2.G) in concert with the level of financial investment to inform the assessment of accrued mitigation credit is intended to provide a transparent and flexible process for evaluating the success of the KSHCP minimization and mitigation program.
## 7.6 Budget Summary Table

Table 7-5: Summary of KSHCP costs throughout the 30-year term as estimated by Pacific Rim Conservation, based on annual costs in Appendix G, Table 1. **This table does not include Changed Circumstance/Adaptive Management or Financial Assurances Costs.** The Participants anticipate that the initial Prime Contractor will be Pacific Rim Conservation for the initial five years, with options to extend.

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8. ALTERNATIVES TO THE TAKING

Section 10(a)(2)(A)(iii) of the Endangered Species Act of 1973, as amended, and 50 CFR 17.22(b)(1)(iii) and 17.32(b)(1)(iii)] requires that alternatives to the taking of species be considered and reasons why such alternatives are not implemented be discussed. This chapter addresses this requirement.

8.1 NO ACTION ALTERNATIVE

The No Action Alternative means that an HCP would not be finalized and an ITP/ITL would not be potentially issued. This also means current conditions and activities that cause take of Federally listed species would continue absent take authorization in violation of Federal and State law.

Many HCPs commonly include a “no-action” alternative in a context where the action at issue is not already ongoing. Under those circumstances, the no-action alternative would obviate the need for an ITP/ITL because the action likely to cause take would not occur.

However, in the case of the KSHCP, the actions causing take have been ongoing (in some cases for decades) and is compounded by the effects of multiple existing facilities. Therefore under the “no action” alternative, entities on Kaua‘i causing incidental take would continue operations with or without light minimization measures in place, without incidental take permit authorization from the DLNR or the USFWS under the KSHCP.

This alternative was not selected for several reasons, including the fact that in most cases the effects of light attraction can be reduced but not eliminated, leaving entities out of compliance with Federal and State law. In addition, failure to mitigate for the take that cannot be eliminated will continue to imperil these very vulnerable native species. However, it is likely that when considered island-wide, unavoidable take of the listed seabird species would inevitably continue and would be unmitigated and unauthorized. In addition, the entities with continuing take would remain exposed to enforcement actions either via one or both of the wildlife agencies as well as third parties under the Federal ESA.

8.2 THE “NO INCIDENTAL TAKES” ALTERNATIVE

As noted above, the effects of light attraction causing take of listed seabirds can be minimized but not entirely eliminated. Thus, a “no incidental take” alternative necessitates that all businesses and agencies on Kaua‘i would need to modify existing and future use of artificial light to completely avoid incidental take of the Covered Seabirds. This would mean eliminating most, if not all, sources of artificial lighting during the fallout season. This alternative is not feasible for several reasons. Artificial lights in publicly used facilities such as parking lots, recreational centers, hotels, harbors, and airports are necessary for public safety and security. There are too many existing facilities using lighting for it to be practical to eliminate all sources of lighting. It is not reasonable or feasible to extinguish all nighttime lights on Kaua‘i during fallout season. This alternative therefore has little chance of succeeding and does not meet
socioeconomic and regulatory needs for lights and utilities to support the human population on Kauaʻi and was not selected.

8.3 RESTRICTED USAGE OF LIGHTING ALTERNATIVE

As noted above, the effects of light attraction can be minimized but not entirely eliminated. A “restricted usage of lighting” alternative would require that all businesses and agencies on Kauaʻi modify existing and future use of artificial light to avoid incidental take of the Covered Seabirds by restricting light use during certain hours of the night during months when the Covered Seabirds are present on Kauaʻi (April-December). If current data on seabird nighttime movement patterns were used to set the timing restrictions, this would result in 4-8 hours each night when night-time lighting would be restricted (Raine et al. 2017d).

This would mean restricting all sources of artificial lighting during the fallout season. This alternative is not feasible for several reasons. Artificial lights in publicly used facilities such as parking lots, recreational centers, hotels, harbors, and airports are necessary for public safety and security. These facilities require lighting during all night time hours, but especially 2-4 hours after sunset, which coincides with a high movement time and high risk of fallout for Covered Seabirds. It is not reasonable or feasible to restrict use of all nighttime lights on Kauaʻi during fallout season. This alternative therefore has little chance of succeeding and does not meet socioeconomic and regulatory needs for lights and utilities to support the human population on Kauaʻi and was not selected.
9. HONU (GREEN SEA TURTLE) IN THE KSHCP

According to Federal Endangered Species Act, incidental take permits may not be issued to cover take of a listed threatened or endangered species if the Covered Activity also impacts additional listed threatened or endangered species. Thus, since the Covered Activity of artificial lighting has the potential to impact honu hatchlings, they are included in the KSHCP. However, as described in the following sections, no incidental take request for honu is anticipated in the KSHCP. Therefore details related to honu have been summarized in this chapter, separate from other chapters that focus on Covered Seabirds.

9.1 EFFECTS OF ARTIFICIAL LIGHTS ON HONU

Hawai‘i is home to several sea turtle species, including the honu, Hawksbill Turtle - honu‘ea (Eretmochelys imbricata), Olive Ridley Turtle (Lepidochelys olivacea) and the Leatherback Turtle (Dermochelys coriacea). Of these species, only the honu is known to nest regularly on Kaua‘i. Thus, it is the only turtle species with the potential to be affected by Covered Activities of the KSHCP.

Sea turtles nest most successfully on dark, quiet beaches. Lights can cause turtles to abandon nesting efforts, resulting in a false crawl, or a nesting attempt during which the female fails to deposit eggs (Witherington 1992). There is also the potential that gravid female turtles, deterred from nesting due to lights, may shed their eggs at sea (Witherington and Martin 2000). In addition, light pollution may cause some turtles to use sub-optimal nesting habitat due to a lack of better locations. In sub-optimal habitats, the number of hatchlings produced and hatchling survivorship may be compromised, and hatchling sex ratios may be altered.

Once hatchlings emerge from the nest cavity, they are highly sensitive to disorientation by lights, an outcome which causes mortality from dehydration, exhaustion, and/or predation particularly when they are attracted towards lights of developed areas and away from the sea, counter to their natural behavior (Witherington and Martin 2000, Salmon 2003).

Some studies have measured an indirect relationship between the amount of lighted beach development and sea turtle nest densities (Mattison et al. 1993). Adult females seem to use a “straight ahead” method to select a nest site. They do not appear to be affected as much by lights up and down the beach as they are by bright lights in front of them upon emerging (Witherington 1992, Salmon 2003). In addition, distant point sources and urban glow are more likely to affect hatchlings than adult females (Salmon et al. 1992).

Hatchling sea turtles exhibit a robust sea-finding behavior. Although the cues involved in sea finding are complex, hatchlings rely primarily on vision for proper orientation (Salmon et al. 1992, Lohmann et al. 1997, Witherington and Martin 2000). Hatchlings have a tendency to orient toward the brightest direction, but a combination of light and shapes is thought to be responsible for orientation of the clutch once they have left the nest. On natural undeveloped beaches, the brightest direction is almost always away from elevated shapes (e.g., dune, vegetation, etc.) and toward the broad open horizon of the sea (Salmon et al. 1992,
Witherington and Martin 2000). In contrast, on developed beaches, the brightest direction is often away from the ocean and toward lighted structures.

Artificial lighting cues cause either type of disorientation (Witherington 1990, 1997), however, the two behaviors described above are typically lumped under the term “disorientation.” Hatchlings that are disoriented may either travel along a consistent course away from the ocean and toward a light source, or they are unable to establish a particular course and wander aimlessly (Figure 9-1).

![Figure 9-1: Tracks of disoriented loggerhead (Caretta caretta) hatchlings, Melbourne Beach, Florida. Photograph by Blair E. Witherington.](image)

Hatchlings unable to find the ocean, or delayed in reaching it, are likely to incur high mortality from dehydration, exhaustion or predation (Witherington and Martin 2000). If the hatchlings are drawn landward from the beach, they may enter roadways and be run over or become irretrievably lost. Weakened hatchlings that eventually reach the water may still die as they are more vulnerable to marine predators, which are abundant in nearshore waters (Gyuris 1994, Stewart and Wyneken 2004).

### 9.2 HONU TAKE RISK ASSESSMENT

Unlike seabird light attraction data, for which we rely on the SOS program (as described above), honu light disorientation events are rarely witnessed or documented. Sea turtles prefer to nest on beaches with minimal light and human disturbance. Discerning hatchling disorientation relies primarily on following and counting hatchling tracks and is unlikely to be documented unless the nest is being purposefully monitored. There are no systematic surveys for sea turtle nests on Kaua`i and thus the number and location of all nests is not known. Further, nests are not systematically monitored for the effects of light disorientation. Also, evidence of disorientation is easily and rapidly obliterated by natural and anthropogenic factors. Until more data are available on the distribution and success of honu nests, an island-wide quantification of honu take from light disorientation is not possible.
A study by Parker and Balazs (2015) reported 20 honu nesting sites that span the island, some with regular, annual nesting and others documented intermittently. Nesting density at these sites is low (1-2 nests annually). The majority of the known nesting locations are isolated beaches, away from lights and high human traffic, such as Allerton Beach at NTBG.

The process for determining whether an Applicant has a risk of honu take is based on 1) whether there is beachfront property at Applicant facilities with suitable habitat, and 2) whether there is light from the facility that will be visible from this beach habitat (Figure 9-2). Suitable habitat is very general for honu, and is defined as a beach with sufficient sand for digging (T. Jones, 2017, pers. comm.). Presence of native vegetation is also an indicator of suitable habitat.

If there is suitable beachfront habitat at the facility, the next step is to determine if there is light from the facility that is visible from this habitat. If there is no beachfront property, no suitable habitat and/or no light visible from this habitat, then there is no potential for take via the KSHCP Covered Activities.

Figure 9-2: Flow chart of Applicant process for determining risk of honu take via light disorientation.

If there is light visible from suitable habitat on a facility’s property, the Applicant must determine the level of risk for take of honu hatchlings via light disorientation. The following questions may guide this risk assessment:

- Can the visible lights be turned off or minimized during turtle nesting season (May to November)?
• Can sufficient monitoring be done to ensure that any nests are found and properly shielded (as described in Section 9.5)?
• Have there been documented honu nests on this beach before? Lack of documented nests is not an indication that there will not be future nests, but history of nesting could indicate a higher risk for light disorientation take.
• If there have been nests recorded on this beach, have there been documented light disorientation events?

Participants are responsible for minimizing light visible from beach habitat and monitoring for nests (see Section 9.5 below). If nests are found, actions to shield and protect the hatchlings from the effects of light disorientation must be implemented, as described in Section 9.5.

Each Applicant will do their own risk assessment. It is anticipated that Participants with beach front properties can completely avoid future incidental take of honu. Currently there is no provision for requested incidental take of honu in proposed Participant PIPs, and the minimization and mitigation measures outlined in Section 9.4 will be implemented as described to ensure that there is zero take of the species. If incidental take of honu is requested by a Participant during the 30-year term of the KSHCP permit term, commensurate honu mitigation will be developed. The regulatory agencies would submit any such proposed mitigation for public review either as an amendment to the KSHCP or as part of processing a permit application.

9.3 NET EFFECT OF THE KSHCP ON THE HONU
The honu population on Kaua‘i is increasing, as is the State wide population. The effects of light disorientation do not seem to be causing significant negative effects on the overall honu population (Parker and Balazs 2015). To better support this conclusion, more long-term monitoring of honu nests and nest success on Kaua‘i is warranted. Measures undertaken by Participants in the KSHCP to avoid hatchling sea turtle light disorientation and to respond to any disorientated hatchlings on their facility, will further increase the likelihood of the honu population on Kaua‘i continuing to increase. The effects of light disorientation can be mitigated so that this effect does not negatively impact honu populations.

9.4 MEASURES TO AVOID AND MINIMIZE TAKE OF HONU
Measures to avoid and minimize take to achieve Goal 1 of the KSHCP are described in Section 5.3. All actions that are implemented to avoid and minimize take for Covered Seabirds will also benefit honu. Lighting guidelines fit the recommendations by Salmon (2003) to limit the impact of coastal light pollution on turtles.

Reducing predators at facilities will also benefit any honu that chose to nest on facility beaches. Adult turtles may be scared off by dogs, and hatchlings may be subject to predation by dogs or cats.
Outreach materials to inform staff and guests about the potential for nesting honu is also required. As many people as possible should be trained to recognize sea turtle tracks, and the signs of nesting. Materials should also discuss timing of nesting and hatching, other honu behaviors that might be observed (i.e. basking), and laws protecting sea turtles while they are on land. An example handout is provided in Appendix F: Training and Outreach Materials.

9.5 PROTECTION OF HONU NESTS FROM LIGHT ATTRACTION (OBJECTIVE 1.F)

All KSHCP Participants must monitor for nests if they have beachfront property with suitable habitat and visible lights (see Section 9.2 for process to evaluate take risk). Beach monitoring surveys will aid in determining sea turtle presence, active nests, potential threats (e.g., lights, excessive beach debris, deep tire tracks, etc.), and hatch date of nests. Standard monitoring techniques follow suggested protocols in Eckert et al. (1999) and Hillis-Star and Phillips (2012).

Methods & Protocols for Nest Finding and Monitoring:

- Surveys will be conducted between May 15th and December 15th each year.
- Surveys should include sandy areas of all suitable beachfront property and consist of walking the area in the morning to look for evidence of nesting (turtle tracks, digging, presence of turtles etc.).
- Surveys should be completed by staff or volunteers that have completed annual training provided by USFWS or DLNR.
- Surveys should be completed at least once per week during peak nesting season (May-July) bi-weekly for the remainder of the nesting season (August-December).
- All sea turtle activity should be reported immediately to USFWS and DLNR and all potential nest sites shall be protected immediately using measures specified below:
  - Active nests (those at which eggs have been deposited or thought to have been deposited) must be monitored every 1-2 days.
  - Once the nest has been incubating for 45 days, monitors will begin checking the nest daily for signs of hatching to ensure that no obstacles inhibit hatchling movement from the nest to the ocean;
  - Evidence of hatching shall be reported to USFWS and DLNR within 24 hours. USFWS, DLNR, or their designee, will then be responsible for final nest excavation to determine species, proportion of eggs that hatched and to send remaining eggs to NOAA for DNA analysis.
- During nest surveys and nest monitoring the following minimum data shall be collected:
  - Maps of surveyed beaches which indicate:
    - The property and facilities of the Participant conducting the monitoring, and proximity to the beach that will be monitored;
    - Lights visible from the beach;
    - The general survey route along the beach;
    - Length of the beach monitored;
  - Date, personnel surveying, time spent on the survey;
  - Outcome of the survey – the number of nests found;
  - Nests should be mapped with a GPS unit;
Assessment of potential threats at the nest;
- Status of protective measures installed (e.g. light fences) at all nests found;
- Hatching success and emergence success as determined by final nest excavation.
- Nest excavations shall only be completed by the DLNR or USFWS, or their designee.

(Methods and Protocols adapted from Eckert et al. (1999) and Hillis-Star and Phillips (2012))

The following actions to avoid take are based on the recommendations published in Witherington et al. (2014), Lake (2008), Salmon (2006) and Witherington and Martin (2003)

- If an active honu nest is found at a Participant facility, the most effective way to prevent hatchling disorientation is to turn off any lights that are visible from the nest site.
- If this is not possible,
  - lights must be shielded so that they do not shine on the nests;
  - a temporary light-proof silt fence must be erected that will not further endanger the nest and hatchlings. “Light-proof fencing” is a temporary fence built from wooden stakes and opaque black silt fence fabric.
- If the nest is located on a public beach, installation of a fence may draw attention to the nest and increase the risk of vandalism – in this case, the shielding and / or removal of lights is even more important.
- Participants should contact the NOAA Stranding Hotline and KSHCP Prime Contractor to assist with installing fence adjacent to nests.
- Materials and any installation costs will be the responsibility of the Participant.

The following fencing technique is recommended wherever light visibility from the nests, as visible from the sand surface, cannot be eliminated or shielded at the light source.

a. The fence must be tall enough to shield the visibility of lights at Participant facilities and placement must be approved by a qualified biologist (e.g. DAR, NOAA, DOFAW, USFWS, biological consultant, or non-profit organization may be specified in the PIP);
b. Photographs and GPS coordinates of the honu nest(s) shall be documented and the fence shall be placed 7 days prior to the expected hatch date, or when a sandy depression develops within the defined nest area, to indicate hatchlings are in the process of emerging. Photographs of lights at night from the nest before and after the fence installation shall be taken;
c. The fence will be in place and maintained daily prior to hatchling emergence to be effective. Adjustments to the fence may be made with approval of a qualified biologist;
d. After the honu hatchlings have emerged and entered the ocean, the fence shall be removed;

Areas seaward of the nest shall be maintained free of ocean debris and garbage on a daily basis. Feral and loose animals such as dogs, cats and rats shall be controlled per requirements of Section 5.3.2.
Vehicles can crush hatchlings and deep tire ruts can trap hatchlings inside. Therefore, a ban on beach driving at Participant properties during the expected hatching period must be enforced and vehicle entry routes (even informal ones) must be effectively blocked off. “Enforcement” activities could include monitoring for beach driving and calling the police, DOCARE and / or the county if beach driving occurs. Daily raking or smoothing deep sand tracks adjacent to the nest is also required one week prior to and after the expected hatch date.

There is not anticipated to be any incidental take of honu requested in the KSHCP, as monitoring and nest protection measures described in Section 9.5 will be implemented by all Participants with visible lights on beachfront property. However, if honu hatchling disorientation does occur, the following protocols should be followed:

- The Department of Aquatic Resources (DAR) should be contacted immediately so the hatchling turtles are only handled by staff or volunteers permitted to handle endangered species.
- Disoriented hatchlings should be protected from foot or vehicle traffic, predation, and handling.

All Participant staff should be trained on Standard Operating Procedures (SOPs) with regard to hatchling disorientation, to minimize take impacts.

9.6 ADAPTIVE MANAGEMENT FOR HONU

The KSHCP was drafted assuming that all take of honu can be avoided through actions to identify honu nests prior to hatching and to implement temporary conservation measures to prevent hatchling disorientation from artificial light as outlined above. If honu nests cannot be effectively identified in advance or if temporary measures are insufficient to prevent hatchling disorientation, and incidental take occurs, the Prime Contractor affected Participant will meet with USFWS and DLNR to discuss the probable reasons for the situation and possible changes or alternatives. This might include an evaluation of monitoring protocols and the process for installing light shielding around the nests. Minor changes to protocols compatible with existing funding can be made as soon as practicably possible. If take cannot be avoided, the affected Participant will work with the wildlife agencies to amend the Plan to provide honu mitigation. If not considered feasible to provide mitigation through the KSHCP, the Participant will need to develop its own HCP for honu take. Under either scenario, the Participant should apply for an incidental take permit/license.
10. **GLOSSARY FOR KSHCP AND ALL ASSOCIATED APPENDICES**

**Active Burrow**: Determined when an adult bird is either observed or when signs of bird presence are documented during the breeding season (e.g., feathers, guano, digging, etc.).

**Adaptive Management**: A systematic science based approach for managing complex ecosystems that face a high degree of uncertainty. This approach aims to reduce uncertainty by incorporating what is learned from management, monitoring, and intensive research into future management actions.

**Adult**: Life stage in which a species has reached sexual maturity.

**Applicant**: A non-Federal entity seeking an Incidental Take License and an Incidental Take Permit under the Kaua’i Seabird Habitat Conservation Plan, once accepted, the “Applicant” becomes a “Participant”.

**Avoidance Measures**: Actions that aim to eliminate all potential take of a Covered Species.

**Biological Goals (specific to the KSHCP)**: To implement a statewide conservation strategy, for the duration of the Incidental Take Licenses and Permits, that supports the conservation goals of the State and Federal management and recovery plans.

(1) is “Under the KSHCP, avoid and minimize take impacts to the Covered Seabirds caused by nighttime lighting on Kaua’i to the maximum extent practicable for the 30-year term of the KSHCP. The effects of nighttime lighting on the Covered Seabirds represent a major threat to their survival and recovery.”

(2) is “Under the KSHCP, mitigate authorized take impacts of the Covered Seabirds by enhancing, protecting and managing suitable seabird breeding habitat on Kaua’i to facilitate successful production of fledglings at a level that over the 30-year term of the Plan offsets or exceeds the impacts of take caused by Covered Activities on the production of fledglings in the wild.”

**Biological Objectives (specific to the KSHCP)**: As an extension of the Conservation goals, the objectives were developed from the USFWS and DLNR recovery and management planning documents and are intended to satisfy the Federal and State regulatory requirements for issuance of Incidental Take Licenses and Permits. An example would be to avoid take of Covered Seabirds due to light attraction by removing or turning off lighting as specified in the Participant Inclusion Plan.

**Biological Opinion**: A document prepared by the Fish and Wildlife Service (USFWS) for all Participant Inclusion Plans (PIP) submitted by Applicants. As required by the Endangered Species Act (ESA), the document addresses whether the proposed activities will jeopardize the continued existence of the listed species or result in the destruction or negative alterations of the listed species’ critical habitat.
**Biosecurity:** Systematic measures intended to protect against the introduction or spread of harmful organisms to other plant and animal life (e.g. monitoring a predator exclusion fence line for any openings that might allow predators into a seabird nesting colony).

**Breeding Pairs:** Two animals that copulate and work cooperatively to produce offspring.

**Breeding Probability:** The likelihood that any one animal will breed in a given year.

**Breeding Success:** Number of chicks fledged from number of burrows active

**Carapace:** Bony or chitinous case or shield covering the back or part of the back of an animal (as a turtle or crab).

**Changed Circumstances:** As defined by Federal regulation (50 CFR §17.3), this refers to circumstances affecting a species or geographic area covered by the HCP that can be reasonably anticipated by the Applicant or wildlife agency and to which the parties can plan a response. Adaptive Management is one type of Changed Circumstances.

**Colony:** Area where birds nest and breed in close proximity as a group, often sharing communal behaviors for the benefit of the entire group. The size of the colony can vary from just a few breeding pairs to hundreds or thousands of birds depending on the species and availability of resources, including suitable nest sites and takeoff/landing zones.

**Colony-based Mitigation:** Efforts made to reduce primary threats (e.g., predation, burrow destruction by ungulates) at Covered Seabird breeding colonies.

**Colony Creation:** Small, existing colonies can be augmented and new colonies can be created, in a predator-free fenced enclosure, by increasing the colonization rate of an area using techniques such as social attraction and/or translocation.

**Covered Activities:** Activities that cause the incidental take of a Covered Species. Under the KSHCP this includes the placement, operation, and maintenance of light structures that can cause disorientation of fledgling seabirds and hatchlings of the honu.

**Covered Seabirds:** The ‘a’o or Newell’s shearwater (*Puffinus auricularis newelli*, threatened); the Hawaiian petrel or ‘ua’u (*Pterodroma sandwichensis*, endangered); the band-rumped storm-petrel or ‘akē’akē (*Oceanodroma castro*, endangered).

**Critical Habitat:** As a species is proposed for listing, USFWS is required to consider if the species survival is dependent upon vital geographical areas. The Endangered Species Act regulations specify the criteria for designating Critical Habitat as "those physical and biological features that are essential to the conservation of a given species and that may require special management considerations or protection" (50 CFR 424.12).
**Cut-off Lighting:** Lighting with flat glass lenses that eliminate or minimize glare and produce no upward visible light.

**Downed Seabirds:** Seabirds on the ground in locations where they normally should not be found, usually as a result of attraction and disorientation by artificial lights or structure collisions. These birds are unable to get off the ground again naturally.

**Enclosure:** An area that has been encompassed by a fence (i.e., ungulate, feral cat, or predator proof fencing) or by a combination of fencing along with a natural barrier such as a cliff.

**Endangered Species Act (ESA):** A key legislation for both domestic and international conservation. The act aims to provide a framework to conserve and protect endangered and threatened species and their habitats. It is administered by the U.S. Fish and Wildlife Service and the Commerce Department’s National Marine Fisheries Service (NMFS).

**Endemic (endemism):** A species that is exclusively found in a specific area or region and is not found to naturally occur anywhere else. For example, The ‘a’o and the ‘ua’u can only be found in the central Pacific ocean and Hawaiian Islands.

**Enrollment Package:** This includes a written request (e.g. cover letter) from the landowner, facility operator, or other responsible party; State and Federal application forms (with Federal application fee); a completed Participant Inclusion Plan; an Implementing Agreement; and the final approved Habitat Conservation Plan Document.

**Essential Lighting:** A category of Participant facility lighting that cannot be turned off due to the necessity of the illumination for operation and/or safety at the facility.

**Facility:** Structure built, installed, or established to serve a particular purpose.

**Fallout:** When a seabird lands at a location that it normally would not have landed as a result from attraction and disorientation to artificial lights. These birds cannot get airborne again naturally.

**Fallout Season:** September 15th to December 15th, when the majority of ‘a’o and ‘ua’u are fledging from their burrows.

**Fledging:** The act of leaving the nest/burrow for the first time and migrating to the ocean to begin foraging. After fledging, seabirds will not return to their natal burrow until they are 2-5 years old (sub-adults).

**Fledgling:** A young bird, typically with fully developed wing muscles and feathers, that leaves the nest for good and is able to survive away from the nest.

**Fledging Success:** Number of chicks fledged from all successfully hatched chicks.
**Flight Corridor:** Heavily used flight path; defined airspace through which individuals of a particular species will travel regularly in transit between foraging areas and nest site. Areas in which regular bird traffic is reasonably predictable.

**Flyways:** Common flight paths that utilize natural topographic features leading inward or outward from the mountainous interior where nest sites are located, typically flying seabirds are more concentrated here than elsewhere.

**Ground Calling:** Seabirds heard calling from the ground that suggests possible breeding activity in the vicinity of the calls, whereas, seabirds heard calling in flight may be the result of birds transiting over the island while traveling to or from the breeding colony.

**HAPE:** ‘ua‘u or Hawaiian Petrel (*Pterodroma sandwichensis*). This is based on an ornithological naming convention that creates standardized 4–letter code from the first two letters of the common names.

**Hatchling:** A young animal that has recently come out of its egg. All of the Covered Species emerge from eggs and may be referred to as a “hatchling”, but in the KSHCP this is used in particular with reference to sea turtles.

**Habitat Conservation Plan (HCP):** An incidental take permit is required when non-Federal activities will result in “take” of threatened or endangered wildlife. A habitat conservation plan (HCP) must accompany an application for an incidental take permit. The purpose of the habitat conservation planning process associated with the permit is to ensure there is adequate minimizing and mitigating of the effects of the authorized incidental take.

**Impacts to Covered Species:** The effects that Covered Activities have on the Covered Species (e.g., death of Covered Seabirds due to light attraction, death of honu hatchlings due to light disorientation, etc.).

**Implementing Agreement:** A planning document that is part of the required Applicant enrollment package needed in order to receive an Incidental Take Permit.

**Incidental Take:** The taking of a species that is listed as endangered or threatened under the Endangered Species Act that is "incidental to, and not the purpose of, carrying out of an otherwise lawful activity" (50 CFR 17.3).

**Incidental Take License ITL:** All qualifying private, non-Federal entities, can request an incidental take license (ITL) under §195D-4(g) of the Hawai‘i Revised Statutes (HRS). The Incidental Take License provides a way for the State to authorize take that occurs as a result of otherwise legal activities. This licensing document must be accompanied with an approved Habitat Conservation Plan.
Incidental Take Permit ITP: Pursuant to Section 10(a)(1)(B) of the Endangered Species Act (ESA) of 1973, a permit can be issued by USFWS to non-Federal entities, allowing incidental take of an endangered or threatened species when the take results from otherwise lawful activities. This permitting document must be accompanied with an approved Habitat Conservation Plan.

Invasive Species: A non-native or non-indigenous organism that negatively affect the habitat that it has invaded. Environmental, ecological, and/or economic impacts may result from the invasion.

IUCN Red List: International Union for Conservation of Nature maintains a list of the conservation status of all plant and animal species, updated with scientific information and based on a globally recognized system for identifying risk of extinction. For more information see: www.iucnredlist.org.

Kaua‘i Seabird Habitat Conservation Plan (KSHCP): This project is undertaken by the State Department of Land and Natural Resources Division of Forestry and Wildlife (DLNR-DOFAW). The goal is to provide a streamlined, cost-effective way to attain legal authorization and coverage for unavoidable incidental take of Kaua‘i’s endangered and threatened seabirds and sea turtles due to light attraction and to achieve net conservation benefits for the Covered Species.

KSHCP Stakeholders: Team comprised of representatives from the KSHCP Implementing Entity (IE), Participants, USFWS, DOFAW and KESRP and other entities that will meet annually (at a minimum) to review KSHCP Annual Report, make management recommendations and support implementation of the KSHCP.

Life History Parameters: Factors that affect the likelihood of an individual from surviving one year to the next. The matrix modeling was based on the parameters of survival and fecundity (age of first breeding, breeding probability, reproductive success and sub-adult and adult survivorship).

Light Attraction: Disorientation in nocturnal seabirds or sea turtle hatchlings caused by artificial lighting.

Light Disorientation: Altered behavior in hatchling sea turtles that are attracted to an artificial light source and do not migrate directly to the ocean after emerging from their nest.

Light(ing) Intensity: Measure of the wavelength-weighted power emitted by a light source in a particular direction per unit solid angle, based on the lumosity function, a standardized model of the sensitivity of the human eye. The Standard International unit of luminous intensity is the candela (cd).

Listed Species: Any species designated as threatened or endangered under the Endangered Species Act.
Lumens: SI unit of luminous flux, equal to the amount of light emitted per second in a unit solid angle of one steradian from a uniform source of one candela.

Maximum Extent Practicable: Fully consistent with the enforceable policies of the management program unless full consistency is prohibited by existing laws or regulations. Involves applying best management practices (BMPs) that are effective in reducing take.

Minimization Effort: Action taken by Participant or permittee to reduce activities causing take.

Mitigation: [Environmental, compensatory] describes projects or programs intended to offset known impacts to an existing historic or natural resource such as a stream, wetland, endangered species, archaeological site, or historic structure.

Mitigation Action: Measure that reduces or addresses potential adverse effects of a proposed activity on species covered by a HCP. Should address specific needs of the species involved and be manageable and enforceable. Actions may take many forms, such as preservation (via acquisition or conservation easement) of existing habitat, enhancement or restoration of degraded or a former habitat, creation of new habitats, establishment of buffer areas around existing habitats, modifications of land use practices, and restrictions on access.

Mitigation Production: The number of birds that were produced, or able to successfully fledge at a mitigation site. Most often used in reference to biological production at a mitigation site in comparison to an unmanaged breeding site.

Mitigation Sites: Project area receiving mitigation action.

Monitoring: The systematic surveillance or sampling of air, water, soil, and biota in order to observe and study the environment, and to derive knowledge from this process. The processes and activities that need to take place to characterize and monitor the quality of the environment or effectiveness of a project.

Moon Phase: Shape of the illuminated (sunlit) portion of the moon as seen by an observer on Earth. Changes cyclically as the moon orbits the earth, and can be useful in predicting fallout of covered seabird fledglings during the fledging season.

NESH: ‘a’o or Newell’s Shearwater (Puffinus auricularis newelli). This is based on an ornithological naming convention that creates standardized 4–letter code from the first two letters of the common names.

Net Benefit: Abbreviated reference to “net conservation benefit”, a requirement under Hawai’i State law for HCPs to mitigate commensurate for the requested take plus additional mitigation to ensure the likelihood of the survival and recovery of the species in the wild.
Non-Federal Entities: Any entity without Federal status, as this is a requirement for eligibility.

Participant Inclusion Plan (PIP): A plan delineated by the Applicant describing Covered Activities at facilities, efforts to avoid and minimize take, and requested take for each Covered Species.

Participant: A non-Federal entity holding an Incidental Take License and an Incidental Take Permit under the Kaua‘i Seabird Habitat Conservation Plan. Prior to being accepted, the “Participant” is referred to as an “Applicant”.

Pelagic: Related to, or living in, the sea, far from shore.

Permittees/Permit Holders: Each Participant in the KSHCP will be a permittee with their own individual ITL and ITL.

Polygon: Area of calling activity recorded during an auditory survey, classified as either ‘heavy’ or ‘light’, the boundaries of which are defined subsequently on a map by the surveyor. May also include visual flight observations and/or breeding evidence on the ground such as burrows, scrapings, and guano.

Predator Control: The act of controlling animals defined as predators via a variety of techniques. In the KSHCP the primary predator for which predator control techniques are applied consist of non-native rats, feral pigs, feral cats, and barn owls.

Predator Eradication: Complete removal of predators from within a predator-proof enclosure or reserve featuring natural barriers.

Predator-proof Fence: A fence specially designed to exclude predators from entry to an enclosure. Can be created to exclude a variety of predators, from a 2 day old baby mouse (small mesh) to just ungulates.

Prime Contractor: The entity responsible for administering and coordinating all facets of the Seabird Mitigation under the KSHCP. This includes compiling, preparing, and submitting necessary information to the regulatory wildlife agencies, DLNR and USFWS, to enable the agencies to determine compliance with the terms and conditions of each ITP/ITL issued.

Productivity: Number of fledged young per nesting pair of seabirds.

Recovery Plan: A document which specifies what research and management actions are necessary to support recovery of a listed species, but does not itself commit manpower or funds. Recovery plans are used in setting funding priorities and providing direction to local, regional, State, and Federal planning efforts.

Seabird: A bird that frequents coastal waters and the open ocean.
Seabird Fallout Period: The time period each year (September 15-December 15) when listed seabirds on Kaua‘i are fledging from their nests and may become subject to light attraction.

Site: Location that has been identified by HCP planning as a project area slated to receive monitoring in any capacity, ranging from the passive, such as the seasonal installation of an acoustic monitoring unit (song meter), to the highly active, such as the installation of a predator-free refugium for translocation and social attraction.

Social Attraction: A colony creation technique whereby seabirds are attracted to an area to initiate breeding by playing recordings of other seabirds of the same species. This is an effective technique due to the colonial nature of seabirds.

Stakeholders: Individuals or entities with an investment in the outcome of a planning process.

Sub-adult: For Covered seabirds in the KSHCP, this term refers to birds 2-5 years old who have not reached sexual maturity.

Take: To harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect endangered or threatened species of aquatic life or wildlife, or to cut, collect, uproot, destroy, injure, or possess endangered or threatened species of aquatic life or land plants, or to attempt to engage in any such conduct.

Triggers: Established milestones or circumstances that if not met will initiate the need for Adaptive Management.

Upper Limahuli Preserve (ULP): An upland area on the northern coast of Kaua‘i that is owned and managed by the National Tropical Botanical Garden. An ungulate fence was installed to protect rare plants and seabird nesting habitat, and active predator control in the preserve is ongoing.

Unforeseen circumstances: As defined by Federal regulation (50 CFR §17.3), this refers to circumstances affecting a species or geographic area covered by the HCP that cannot be reasonably anticipated by the Applicant or wildlife agency.

Ungulates: A hoofed mammal. On Kaua‘i, existing ungulates that may trample burrows and seabird habitat, or predate on nesting seabirds include feral pigs and goats and deer.

Wildlife Agencies: Public agencies involved in permitting and regulation of wildlife. These include the Department of Land and Natural Resources (DLNR) Division of Forestry and Wildlife (DOFAW) at the State level, and the US Fish and Wildlife Service (USFWS) at the Federal level.
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KAHUAMAʻA SEABIRD PRESERVE
MANAGEMENT PLAN

PART OF THE KAUAʻI SEABIRD HABITAT CONSERVATION PLAN
Helen Raine, K. Yuki Reiss, Jessica Hallman Behnke
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1. SUMMARY MANAGEMENT PLAN

The objective of the Kahuama’a Seabird Preserve Management Plan is to create and maintain a terrestrial predator proof sanctuary for ‘a’o. Birds will be attracted to the site through a Social Attraction component.

Implementation of the plan will, in part, fulfill one of the biological goals of the Kaua‘i Seabird Habitat Conservation Plan (KSHCP): to mitigate authorized take impacts on the Covered Seabirds in the HCP (‘a’o or Newell’s Shearwater –*Puffinus auricularis newelli*, ‘ua’u or Hawaiian Petrel - *Pterodroma sandwichensis* and Hawai‘i distinct population segment (DPS) of the ‘akē‘akē or band-rumped storm-petrel - *Oceanodroma castro*, hereafter ‘akē‘akē) due to light attraction by the participants of the plan, and provide a net benefit to the populations of the Covered Seabirds.

Management of the Kahuama’a Seabird Preserve (also referred to as ‘the site’) will be carried out by the Prime Contractor, on behalf of the participants in the KSHCP. The site is located in Kōke‘e State Park and Nā Pali Coast State Park.

The creation of the site will commence with the construction of a predator proof fence around 2ha of suitable seabird habitat. Only terrestrial predators can be completely excluded, but barn owls will also be controlled to protect the birds within the site and in neighboring source colonies throughout the Kalalau Valley. Feral cats will also be removed at ingress points to the fenceline area and into neighboring source colonies in the Kalalau Valley.

The project will proceed with the removal of Black Rat (*Rattus rattus*), Norway Rat (*Rattus norvegicus*), Polynesian Rat (*Rattus exulans*), feral pigs (*Sus scrofa*), Black-tailed Deer (*Odocoileus hemionus columbianus*), feral goats (*Capra hirca*) and feral cats (*Felis catus*) inside the fence. House Mouse (*Mus musculus*) is expected to be eradicated by rat control but is not a target species. Eradication will be complete within the first year. The fence will be monitored constantly to ensure that predators cannot breach it and there will be monitoring within the fenced area in case of reinvasion.

After predator eradication within the fence is complete, the social attraction component of the project will be initiated to bring ‘a’o to the project site to breed. This will consist of installing artificial burrows and a speaker system to broadcast calls, simulating a large colony. A variety of monitoring methods will be undertaken to assess the effectiveness of management actions. For seabirds, these will include auditory and visual surveys, camera monitoring, acoustic bird monitoring and bird banding.

Invasive species (seabird habitat modifiers) will be removed from the site to optimize seabird nesting habitat. Monitoring will include a plant survey every five years.

Reporting obligations for the IE will include an annual report.
2. INTRODUCTION

Kahuama’a Seabird Preserve is a 2 hectare (ha) Social Attraction Site (SAS) for ‘a‘o or Newell’s Shearwater (Puffinus auricularis newelli) that will be surrounded by a terrestrial predator proof fence. It is located along the Western rim of the Kalalau Valley, part of the Nā Pali coast on the Island of Kaua‘i, Hawai‘i at approximately 22°08'57.1"N 159°38'12.2"W.

The site is being developed as mitigation for “unavoidable incidental take impacts”1 of ‘a‘o, a listed seabird, as part of the Kaua‘i Seabird Habitat Conservation Program (KSHCP). In addition, barn owl (Tyto alba) control around the site and the Kalalau Valley will provide mitigation for the take of ‘ua‘u or Hawaiian petrel (Pterodroma sandwichensis) and ‘akē‘akē or band-rumped storm-petrel (Oceanodroma castro). Collectively, all three species are referred as the “Covered Seabirds”.

The KSHCP is an island-wide program to permit and mitigate for impacts to Kaua‘i’s endangered seabirds caused by light attraction. The KSHCP aims to offset take and provide conservation benefit to these species by increasing productivity at breeding colonies. The KSHCP has set ‘Biological Goals’ and ‘Biological Objectives’. The purpose of this Kahuama’a Seabird Preserve Management Plan is to explain how the objectives toward achieving the goal of “mitigating authorized take impacts of the Covered Seabirds by enhancing, protecting and managing suitable seabird breeding habitat on Kauai to facilitate successful production of fledglings at a level that over the 30-year term of the Plan offsets or exceeds the impacts of take caused by Covered Activities on the production of fledglings in the wild” will be delivered and monitored. As such, this Management Plan fulfils certain legal parameters of the KSHCP process as well as describing the management on site. The full suite of KSHCP requirements is described in the KSHCP document to which this Management Plan is an appendix.

‘Social Attraction’ is a well-established conservation strategy to encourage seabirds to breed in a predator-free location by the simulation of colony activity, principally through the playback of breeding calls, combined with the provision of artificial burrows area (Kildaw 2005, Sawyer and Fogle 2010, Major 2011, Jones and Kress 2012, Raine 2015b). The technique results in high productivity within a small and easily managed.

There are several benefits to establishing a breeding colony within a protected site free of terrestrial predators. The site offers protection from predation which is known to severely impact the breeding of both species on Kaua‘i (Raine et al. 2017f, d, g, e, Raine et al. 2017h). Breeding in a predator-free area can result in a positive growth rate, vitally important for these endangered seabirds (Veitch 2011, Young et al. 2012, Kappes 2014, Buxton 2015). In addition, because of the potential for a high breeding density, a relatively large amount of birds can be

---

1 Section 9 of the Endangered Species Act prohibits taking, possession, sale, and transport of listed species. Taking is defined as to "harass, harm, pursue, hunt, shoot, wound, kill, capture, or collect." If an activity is conducted that would “take” a listed species, an ‘incidental take permit’ is required to avoid being in violation of Section 9 of the Endangered Species Act, a federal offense.
produced in a small area requiring less long term management and funding (Burger 1988, Buxton 2014) – fieldwork for management and monitoring is very labor intensive in this terrain, so having burrows close together for easy monitoring dramatically reduces staff time and thus costs. Finally, creating a “new” colony serves to expand the distribution of the species, recognized as important to the species persistence and survival in the wild (Jones and Kress 2012, Buxton 2015, USFWS 2017b, a). The site also has the potential to provide a sanctuary for other rare and endangered flora and fauna, several species of which are already present at the site. These include candidate or listed forest bird species (nests will be protected from rat predation), ‘ōpe‘ape‘a or Hawaiian Hoary Bat (Lasiurus cinereus semotus) and the suite of plant species shown in Table 7.1.

Social Attraction relies on broadcasting breeding calls to attract seabirds to breed; distance to the source population has been identified as one of the most important drivers of seabird recolonization (Buxton et al. 2014). Research by the Kaua‘i Endangered Seabird Recovery Project (KESRP) indicates that Kahuama’a is located close to several “hot spots” (concentrated locations of seabird activity) on the Nā Pali coast, with the nearest “hot spot” polygon just 210m away, two more within 60m, and 26 within 3km. In fact, the majority of known breeding colonies of ‘ā‘o and ‘ua‘u on Kaua‘i are located within 25km of the mitigation site. In addition, ‘ā‘o and ‘ua‘u calls were recorded at the site in 2016 using an acoustic song meter (Raine et al. 2016). Kahuama’a Seabird Preserve has therefore been identified as an excellent location for a SAS, within known seabird flyways along the Nā Pali Coast and nearby existing breeding colonies such as Hono O Nā Pali Natural Area Reserve and in Kalalau State Park.

In addition to the predator proof fenced area, Kahuama’a Seabird Preserve will include feral cat removal at ingress points to nearby source colonies in the Kalalau Valley, as well as to the fenceline. The project is expected to benefit this native vegetation as well as other native wildlife such as the ʻōpeʻapeʻa, pueo or Hawaiian Short-eared Owl (Asio flammeus sandwichensis) and various candidate or listed forest birds.

The site is on land owned and managed by the State of Hawai‘i - Department of Land and Natural Resources (DLNR) Division of State Parks and straddles two parks: Kōke‘e State Park and Nā Pali Coast State Park. The area is a designated hunting unit, restricted to archery use only (no firearms). Discussions with State Parks have indicated strong support for the project, which is in line with State Park goals of protecting and restoring native ecosystems.

When the Kahuama’a Seabird Preserve is operational, management of it will pass to the KSHCP Implementing Entity (IE), DLNR Division of Forestry and Wildlife (DOFAW), on behalf of the Participants. Prior to the commencement of management by the IE of the KSHCP, a Memorandum of Agreement with State Parks will be in place.
3. VISION STATEMENT

The Kahuama’a Seabird Preserve will become a terrestrial predator free sanctuary for a thriving colony of breeding ‘a’o. ‘Ua’u may also be present. The site will continue to attract new birds as well as seeing the return of previous breeders (both chicks and adults). Ongoing management will ensure that the interior of the fenced area remains completely terrestrial predator free and that feral cats are controlled at ingress points to the site and to neighboring source colonies. Mitigation for the take of ‘ua’u and ‘akē’akē will be provided through barn owl control. Neighboring colonies will also benefit from this work. The site will provide optimal breeding habitat through artificial burrows and the ongoing removal of invasive species. The site will also serve as a sanctuary for rare and listed plants.

Kahuama’a will act as a positive example of a Social Attraction Site benefitting a rapidly declining population of seabird. Key to the vision is that the site will meet its targets for successfully providing mitigation to offset take of a listed species as outlined in the KSHCP document.

4. INFORMATION

4.1. Location and Statutory Information

The Kahuama’a Seabird Preserve is located near the terminal end of Highway 550, within Kōke’e State Park and Nā Pali Coast State Park, between the Kalalau and Pu’u O Kila visitor lookouts, identified on the map as part of Kahuama’a Flat (Figure 4.1)

![Image of Kahuama’a Flats with Kalalau Lookout. Red pin indicates SAS. Google Maps.](image)

Figure 4.1: Satellite image of Kahuama’a Flats with Kalalau Lookout. Red pin indicates SAS. Google Maps.
Figure 4.2. Map of SAS location in relation to Kalalau Valley.

Figure 4.3. Photographs of the SAS along the rim of the Kalalau Valley. Y Reiss.
4.2 Legal Status (legislation for site creation, ownership, official managers), MOA

The site is situated on lands managed by DLNR Division of State Parks as Kōkeʻe State Park and Nā Pali Coast State Park. Prior to the commencement of management by the IE of the KSHCP, a Memorandum of Agreement between DLNR and State Parks will be in place as an Appendix to the KSHCP which will include all relevant permits for the activities specified in the Management Plan (for example use of rodenticide, erection of fence etc...). Discussions with State Parks have indicated strong support for this project, which is in line with State Park goals of protecting and restoring native ecosystems.

4.3 Access

The site lies immediately north of and adjacent to Highway 550. A small amount of parking (sufficient for construction and field staff) is available on the west side of the road adjacent to the site. Prior to fence construction, ideally this will be graveled as it is currently muddy (discussions will be held with State Parks or Highways upon commencement of the Management Plan). No public parking or vehicular access is currently planned as the focus of the project is the creation and maintenance of the seabird site for mitigation purposes.

There are no well-defined trails to the site. As management commences at the site, a foot trail to the site will be created to avoid rare plants (see section 17.7.4). Access for fence building and maintenance will use this new foot trail, with heavier equipment and supplies being dropped via helicopter at specified construction staging location immediately adjacent to the site, which will be large enough to provide storage space (see section 10.3). No permanent or vehicular access is planned.

The site is a designated hunting unit, restricted to archery use only. The site comprises only a tiny fraction of the archery hunting zone, therefore the exclusion of hunters from inside this small enclosure is not anticipated to negatively affect overall access to archery hunting.

4.4 Existing Infrastructure

There are currently no utilities or infrastructure at the site as it is a ‘wildland portion of Kōkeʻe State Park’ (DLNR, 1997) and Nā Pali Coast State Park.
5. ENVIRONMENTAL INFORMATION

5.1 Environmental Setting

Kahuama’a Seabird Preserve is located on the northwestern side of Kaua‘i, along the western rim of the Kalalau Valley and is part of the Nā Pali coast, which is characterized by steep cliffs and deeply eroded canyons and valleys. Figure 5.1

![Figure 5.1. Image of site showing topography.](image)

5.2 Climate

The Kahuama’a Seabird Preserve is located at an altitude of approx. 1250m. The site receives an estimated annual rainfall of around 150-200cm annually with fog (DLNR 1997). The average air temperature in Kōke‘e ranges from 10°C in winter to 20°C in summer.
In the past 50 years, strong winds, heavy rains and storm surges caused by periodic hurricanes have resulted in devastating effects. Hurricanes Iwa (1982) and ‘Iniki (1992) caused extensive damage to native plant communities.

5.3 Topography/Geology

The site consists of approximate 2ha of mostly sloping ground, interspersed with small hillocks. Carpenter (1994) describes the soils and topography as; “Kōke’e silty clay loam on the upper flat (well-drained soils weathered from igneous rock, probably mixed with volcanic ash). There is rough, mountainous land on the valley wall (very steep land broken by numerous drainages, very thin soil mantle if any, much of surface is rock, rock outcrop, and eroded spots)”.

5.4 Hydrology/Streams, Rivers, Drainages

The site lies within Hanalei aquifer sector / Nāpali System (DLNR 2014) characterized as
- High-level - fresh water not in contact with sea water.
- Unconfined - the water surface is in the upper surface of a saturated aquifer.
- Dike-contained - aquifers are confined in basaltic dike compartments.

There are no streams within the site itself, although in times of heavy rain there is at least one gulch which is likely to channel water.

5.5 Existing Land Use

The primary use of the site and surrounding area is as a State Park which is intended to provide opportunities for outdoor recreation as well as protecting Hawai’i’s natural and cultural history and aesthetic values.

The Kahuama’a Seabird Preserve falls within a designated hunting unit, restricted to archery use only. Firearm hunting is prohibited because of safety concerns for other users in the park and its proximity to the public highway and visitor viewpoints.

6. SOCIAL INFORMATION

6.1 Stakeholders

Success of the Kahuama’a Seabird Preserve depends in part upon cooperation amongst the stakeholders in the project. These include the KSHCP Participants, the IE, the regulatory agencies, conservation groups and landowners. Table 6.1 outlines these groups in more detail and provides a framework for the IE to identify the future point of contact.
### Table 6.1. Stakeholders in Kahuama’a Seabird Preserve

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>KSHCP Participants</strong></td>
<td></td>
</tr>
<tr>
<td>Hawaii Department of Transportation</td>
<td>KSHCP Participant</td>
</tr>
<tr>
<td>Alexander and Baldwin (A&amp;B)</td>
<td>KSHCP Participant</td>
</tr>
<tr>
<td>County of Kaua’i</td>
<td>KSHCP Participant</td>
</tr>
<tr>
<td>Marriott at Kalapaki</td>
<td>KSHCP Participant</td>
</tr>
<tr>
<td>Norwegian Cruise Line</td>
<td>KSHCP Participant</td>
</tr>
<tr>
<td>St. Regis</td>
<td>KSHCP Participant</td>
</tr>
<tr>
<td>Sheraton</td>
<td>KSHCP Participant</td>
</tr>
<tr>
<td>Kauai Coffee</td>
<td>KSHCP Participant</td>
</tr>
<tr>
<td><strong>Agencies</strong></td>
<td></td>
</tr>
<tr>
<td>USFWS</td>
<td>Regulatory / Advisory</td>
</tr>
<tr>
<td>State Parks</td>
<td>Land Owner, mitigation site</td>
</tr>
<tr>
<td>DOFAW Plant Extinction Prevention Program (PEPP)</td>
<td>Regulatory / Advisory</td>
</tr>
<tr>
<td>DOFAW Admin (Oahu)</td>
<td>Regulatory / Advisory</td>
</tr>
<tr>
<td>DOFAW Kaua’i Branch</td>
<td>Advisory</td>
</tr>
<tr>
<td><strong>Prime Contractor</strong></td>
<td></td>
</tr>
<tr>
<td>Pacific Rime Conservation</td>
<td>Mitigation Project Implementation</td>
</tr>
<tr>
<td><strong>Conservation Groups</strong></td>
<td></td>
</tr>
<tr>
<td>KESRP</td>
<td>Advisory</td>
</tr>
<tr>
<td>Koke’e Resource Conservation Program (KRC)</td>
<td>Advisory</td>
</tr>
<tr>
<td>SOS (Kaua’i Humane Society) or other qualified vet / rehab center shearwaters</td>
<td>Resource</td>
</tr>
<tr>
<td>NTBG</td>
<td>Advisory</td>
</tr>
<tr>
<td><strong>Land Users</strong></td>
<td></td>
</tr>
<tr>
<td>Hunters (archers only)</td>
<td>Land User</td>
</tr>
<tr>
<td>Koke’e Discovery Center</td>
<td>Land User</td>
</tr>
</tbody>
</table>

### 6.2 Archaeological, Cultural and Historical interest

In 1994, prior to the construction of the Kalalau Rim Endangered Plant Exclosure (which is within 1km of the Kahuama’a Seabird Preserve), State Park archaeologists conducted a reconnaissance survey in the area of the Kahuama’a Flat. No archaeological sites or features were encountered during this survey (Carpenter and Yent 1994). However, due to dense vegetation and steep slopes, a complete evaluation was not possible. Therefore, while the archaeologists deemed it unlikely that any important archaeological sites exist in this area (there are few such sites in the uplands of Koke’e and the area is thought to have been a resource-gathering zone rather than a permanent habitation), they made several
6.3 Visitors

The principal focus of the Kahuama’a Seabird Preserve is to provide mitigation for unavoidable incidental take impacts to ‘a‘o. As a result, no funding is currently budgeted for outreach. However, the fence will be visible from the road and is between two popular lookouts, the Kalalau Lookout and the Pu‘u O Kila Lookout. Therefore, as part of the Management Plan, the IE will investigate ways to work with partner organizations that might allow for the erection of an interpretation panel at each lookout to explain the purpose of the Kahuama’a Seabird Preserve as well as providing some information on the special importance of ‘a‘o to Kaua‘i. If further funding can be found, the site has potential for education, awareness raising, demonstration and advocacy.

7. BIOLOGICAL INFORMATION

7.1 Habitats and vegetation communities

The Kahuama’a Seabird Preserve is within in a wider area known as the Kalalau rim, an extremely high cliff area which falls over a thousand meters into the Kalalau Valley. Due to the steepness and inaccessibility of the cliff, there are many rare, endemic plants which have survived undisturbed by humans, giving the Kalalau rim unique characteristics. The vegetation at the site is a subtype of ‘Ōhi‘a Lowland Mesic Forest, with ‘uluhe fern (Dicranopteris linearis) comprising much of the ground cover (Williams, 2016 unpublished report). DLNR (1997) notes that this habitat is significant for endangered, threatened, candidate and other plants of concern; a number of rare and endangered plant species have in fact been recorded within and around the site.

There is degradation from the encroachment of invasive and non-native plants, particularly in the understory. They include Australian Tree Fern (Sphaeropteris cooperi), Banana Poka (Passiflora tarminiana), blackberry (Rubus argutus) Bush Beard Grass (Schizachyrium condensatum, Andropogon spp.), Karaka Nut (Corynocarpus laevigatus), Parasitic Maidenfern (Cyclosorus parasiticus), Air Plant (Kalanchoe pinnata), Fire Tree (Morella faya) and Daisy Fleabane (Erigeron karvinskianus). Koster’s curse (Clidemia hirta), Himalayan (Kahili) Ginger (Hedychium gardnerianum) and Strawberry Guava (Psidium cattleianum) are also present towards the road. Many of these plant species are significant threats for seabirds (particularly Australian Tree Fern, Himalayan (Kahili) Ginger and Strawberry Guava), as they modify the habitat in which they breed.

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2 There is some taxonomic confusion about these species in Hawai‘i and they are frequently mis-identified and can co-occur. Ecologically they are, however, similar with regard to their invasion biology. (A Williams, 2017, pers.comm.)
In addition, feral pigs, Black-tailed deer and feral goats inhabit the area and are having a negative impact upon the vegetation community. Surveys carried out before fence construction (included as part of the Management Plan) will improve understanding of the vegetation communities and their condition.

The fenceline was decided upon based on characteristics suitable for seabirds, including vegetation, slope and aspect. However, PEPP experts and botanists from DOFAW and USFWS also identified the area as providing dual benefit for birds and listed plants, with the protection of rare and PEPP plants being a major consideration.

7.2 Flora

During a preliminary site visit by DOFAW Botanist Adam Williams and PEPP Botanist Steve Perlman, several listed plants were observed within the boundaries of the site. These include two federally Endangered Species, two species that are part of the Plant Extinction Prevention Program (PEPP), which indicates that there are less than 50 individuals left in the wild, and four State Species of Concern. These are highlighted in Table 7.1. This represents a very high concentration of rare and endangered plants. It is anticipated that the fence will be of direct conservation benefit to these plants (Williams, 2016, unpublished report).

Surveys carried out before fence construction (included as part of the Management Plan) will detail the exact location and abundance of listed plants, as well as confirming the below species list in Table 7.1.

**Table 7.1. Preliminary plant list from KSHCP Social Attraction Site visit on May 12, 2016 with DOFAW and PEPP botanists. Highlighted plants are federally or state endangered, threatened or PEPP.**

<table>
<thead>
<tr>
<th>Family</th>
<th>Taxon Name</th>
<th>Common Name</th>
<th>Status</th>
<th>FedStat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asteliaceae</td>
<td><em>Astelia argyrocoma</em> A.Heller ex Skottsb.</td>
<td>Pa’iniu</td>
<td>Endemic</td>
<td></td>
</tr>
<tr>
<td>Cyperaceae</td>
<td><em>Carex wahuensis</em> sp.</td>
<td>‘Uki</td>
<td>Endemic</td>
<td></td>
</tr>
<tr>
<td>Amaranthaceae</td>
<td><em>Charpentiera elliptica</em> (Hillebr.) A.Heller</td>
<td>Pāpala</td>
<td>Endemic</td>
<td></td>
</tr>
<tr>
<td>Asparagaceae</td>
<td><em>Chrysodracon aurea</em> (H. Mann) P.-L. Lu &amp; Morden</td>
<td>Halapepe</td>
<td>Endemic</td>
<td></td>
</tr>
<tr>
<td>Araliaceae</td>
<td><em>Cheirodendron fauriei</em> Hochr.</td>
<td>Olapa</td>
<td>Endemic</td>
<td></td>
</tr>
<tr>
<td>Araliaceae</td>
<td><em>Cheirodendron trigynum</em> subsp. <em>helleri</em> (Sherff) Lowry</td>
<td>Olapa</td>
<td>Endemic</td>
<td></td>
</tr>
<tr>
<td>Dicksoniaceae</td>
<td><em>Cibotium glaucum</em> (Sm.) Hook. &amp; Arn.</td>
<td>Hāpu‘u</td>
<td>Endemic</td>
<td></td>
</tr>
<tr>
<td>Dicksoniaceae</td>
<td><em>Cibotium nealiae</em> O.Deg.</td>
<td>Hāpu‘u</td>
<td>Endemic</td>
<td></td>
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<tr>
<td>Pteridaceae</td>
<td><em>Coniogramme pilosa</em> (Brack.) Hieron.</td>
<td>Lo‘ulu</td>
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</tr>
<tr>
<td>Family</td>
<td>Species</td>
<td>Common Name</td>
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<tr>
<td>Rubiaceae</td>
<td>Coprosma kauensis (A.Gray) A.Heller</td>
<td>Kōi</td>
<td>Endemic</td>
<td></td>
</tr>
<tr>
<td>Rubiaceae</td>
<td>Coprosma waimeae Wawra</td>
<td>'Ōlena</td>
<td>Endemic</td>
<td></td>
</tr>
<tr>
<td>Lauraceae</td>
<td>Cryptocarya mannii Hillebr.</td>
<td>Hōlio</td>
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<tr>
<td>Thelypteridaceae</td>
<td>Cyclosorus parasiticus (L.) Farw.</td>
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<tr>
<td>Liliaceae</td>
<td>Dianella sandwicensis Hook. &amp; Arn.</td>
<td>'Uki'uki</td>
<td>Indigenous</td>
<td></td>
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<tr>
<td>Gleicheniaceae</td>
<td>Dicranopteris linearis</td>
<td>'Uluhe</td>
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<tr>
<td>Athyriaceae</td>
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<td>Hō'i'o</td>
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<tr>
<td>Gleicheniaceae</td>
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<td>'Uluhe lau nui</td>
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<td></td>
</tr>
<tr>
<td>Sapindaceae</td>
<td>Dodonaea viscosa Jacq.</td>
<td>'A'ali'i</td>
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<td></td>
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<tr>
<td>Blechnaceae</td>
<td>Doodia kunthiana Gaudich.</td>
<td>'Ōkupukupu, Pāmoho</td>
<td>Endemic</td>
<td></td>
</tr>
<tr>
<td>Asteraceae</td>
<td>Dubautia kalalaunensis</td>
<td>Naenae</td>
<td>Endemic E, PEP</td>
<td></td>
</tr>
<tr>
<td>Dryopteridaceae</td>
<td>Dryopteris fusco-atra var. fusco-atra</td>
<td>'I'i</td>
<td>Endemic</td>
<td></td>
</tr>
<tr>
<td>Elaeocarpaceae</td>
<td>Elaeocarpus bifidus Hook. &amp; Arn.</td>
<td>Kalia</td>
<td>Endemic</td>
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</tr>
<tr>
<td>Elaphoglossaceae</td>
<td>Elaphoglossum paleaceum (Hook. &amp; Grev.) Sledge</td>
<td>Māku'e</td>
<td>Indigenous</td>
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<tr>
<td>Asteraceae</td>
<td>Erigeron karvinskianus DC.</td>
<td>Daisy Fleabane</td>
<td>Naturalized</td>
<td></td>
</tr>
<tr>
<td>Euphorbiaceae</td>
<td>Euphorbia remyi var. remyi</td>
<td>'Akoko</td>
<td>Endemic E</td>
<td></td>
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<tr>
<td>Santalaceae</td>
<td>Exocarpos luteolus C.N.Forbes</td>
<td>Heau</td>
<td>Endemic E</td>
<td></td>
</tr>
<tr>
<td>Pandanaceae</td>
<td>Freycinetia arborea Gaudich.</td>
<td>'Ie'ie</td>
<td>Indigenous</td>
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<tr>
<td>Zingiberaceae</td>
<td>Hedychium gardnerianum Sheppard ex Ker Gawl.</td>
<td>Himalayan (Kahili) Ginger</td>
<td>Naturalized</td>
<td></td>
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<tr>
<td>Aquifoliaceae</td>
<td>Ilex anomala Hook. &amp; Arn.</td>
<td>'Aiea</td>
<td>Indigenous</td>
<td></td>
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<tr>
<td>Rubiaceae</td>
<td>Kadua affinis DC.</td>
<td>Manono</td>
<td>Endemic</td>
<td></td>
</tr>
<tr>
<td>Rubiaceae</td>
<td>Kadua foggiana (Fosberg) W.L.Wagner &amp; Lorence</td>
<td>Manono</td>
<td>Endemic</td>
<td></td>
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<tr>
<td>Crassulaceae</td>
<td>Kalanchoe pinnata (Lam.) Pers.</td>
<td>Air Plant</td>
<td>Naturalized</td>
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<td>Epacridaceae</td>
<td>Leptecophylla tameiameiae (Cham. &amp; Schltld.) C.M.Weiller</td>
<td>Pukiwe</td>
<td>Indigenous</td>
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<tr>
<td>Campanulaceae</td>
<td>Lobelia yuccoides Hillebr.</td>
<td>Pānaunau</td>
<td>Endemic SOC</td>
<td></td>
</tr>
<tr>
<td>Family</td>
<td>Genus and Species</td>
<td>Common Name</td>
<td>Conservation Status</td>
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</tr>
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<td>---------------------</td>
<td>--------------------------------------------------------</td>
<td>-------------------------------</td>
<td>-------------------------</td>
<td></td>
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<tr>
<td>Primulaceae</td>
<td>Lysimachia kalalauensis Skottsb.</td>
<td>no common name</td>
<td>Endemic</td>
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<tr>
<td>Rutaceae</td>
<td>Melicope clusifolia (A.Gray) T.G.Hartley &amp; B.C.Stone</td>
<td>Kūkaemoa</td>
<td>Endemic</td>
<td></td>
</tr>
<tr>
<td>Rutaceae</td>
<td>Melicope feddei (H.Lév.) T.G.Hartley &amp; B.C.Stone</td>
<td>Alani</td>
<td>Endemic</td>
<td></td>
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<td>Myrtaceae</td>
<td>Metrosideros polymorpha var. dieteri J.W.Dawson &amp; Stemmerm.</td>
<td></td>
<td>'Ōhi’a lehua Endemic</td>
<td></td>
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<tr>
<td>Myrtaceae</td>
<td>Metrosideros polymorpha var. glaberrima (H.Lév.) H.St.John</td>
<td></td>
<td>'Ōhi’a lehua Endemic</td>
<td></td>
</tr>
<tr>
<td>Dennstaedtiaceae</td>
<td>Microlepia strigosa var. strigosa</td>
<td>Palapalai</td>
<td>Indigenous</td>
<td></td>
</tr>
<tr>
<td>Myricaceae</td>
<td>Morella faya (Aiton) Wilbur</td>
<td>Fire Tree</td>
<td>Naturalized</td>
<td></td>
</tr>
<tr>
<td>Myrsinaceae</td>
<td>Myrsine alyxifolia Hosaka</td>
<td>Kōlea</td>
<td>Endemic</td>
<td></td>
</tr>
<tr>
<td>Myrsinaceae</td>
<td>Myrsine knudsenii (Rock) Hosaka</td>
<td>Kōlea</td>
<td>Endemic, E, PEP</td>
<td></td>
</tr>
<tr>
<td>Lomariopsidaceae</td>
<td>Neprolepis exaltata (L.) Schott</td>
<td>Kupukupu, Sword Fern</td>
<td>Indigenous</td>
<td></td>
</tr>
<tr>
<td>Oleaceae</td>
<td>Nestegis sandwicensis (A.Gray) O.Deg., I.Deg. &amp; L.A.S.Johnson</td>
<td>Olopua</td>
<td>Endemic</td>
<td></td>
</tr>
<tr>
<td>Solanaceae</td>
<td>Nothocestrum longifolium A.Gray</td>
<td>'Aiea</td>
<td>Endemic</td>
<td></td>
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<tr>
<td>Passifloraceae</td>
<td>Passiflora tarminiana Coppens &amp; Barney</td>
<td>Banana Poka</td>
<td>Naturalized</td>
<td></td>
</tr>
<tr>
<td>Celastraceae</td>
<td>Perrottetia sandwicensis A.Gray</td>
<td>Olomea</td>
<td>Endemic</td>
<td></td>
</tr>
<tr>
<td>Sapotaceae</td>
<td>Planchonella sandwicensis (A.Gray) Pierre</td>
<td>'Āla'a</td>
<td>Endemic</td>
<td></td>
</tr>
<tr>
<td>Araliaceae</td>
<td>Polyscia flynnii (Lowry &amp; K.R.Wood) Lowry &amp; G.M.Plunkett</td>
<td>'Ohe 'ohe</td>
<td>Endemic, E, PEP</td>
<td></td>
</tr>
<tr>
<td>Araliaceae</td>
<td>Polyscia waialealae (Rock) Lowry &amp; G.M.Plunkett</td>
<td>'Ohe 'ohe</td>
<td>Endemic</td>
<td></td>
</tr>
<tr>
<td>Arecaceae</td>
<td>Pritchardia minor Becc.</td>
<td>Loulu</td>
<td>Endemic, SOC</td>
<td></td>
</tr>
<tr>
<td>Myrtaceae</td>
<td>Psidium cattleianum Sabine</td>
<td>Strawberry Guava</td>
<td>Naturalized</td>
<td></td>
</tr>
<tr>
<td>Dennstaedtiaceae</td>
<td>Pteridium aquilinum subsp. decompositum (Gaudich.) Lamoureux ex J.A.Thomson</td>
<td>Kilau pueo</td>
<td>Endemic</td>
<td></td>
</tr>
<tr>
<td>Family</td>
<td>Species</td>
<td>Common Name</td>
<td>Status</td>
<td></td>
</tr>
<tr>
<td>-----------------</td>
<td>----------------------------------------------</td>
<td>-------------</td>
<td>------------</td>
<td></td>
</tr>
<tr>
<td>Rubiaceae</td>
<td><em>Psychotria greenwelliae</em> Fosberg</td>
<td>Köpiko</td>
<td>Endemic</td>
<td></td>
</tr>
<tr>
<td>Rubiaceae</td>
<td><em>Psychotria hexandra</em></td>
<td>Köpiko</td>
<td>Endemic</td>
<td></td>
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<tr>
<td>Rosaceae</td>
<td><em>Rubus argutus</em> Link</td>
<td>Sawtooth Blackberry</td>
<td>Naturalized</td>
<td></td>
</tr>
<tr>
<td>Blechnaceae</td>
<td><em>Sadleria cyatheoides</em> Kaulf.</td>
<td>'Ama 'u</td>
<td>Endemic</td>
<td></td>
</tr>
<tr>
<td>Blechnaceae</td>
<td><em>Sadleria souleyetiana</em> (Gaudich.) T.Moore</td>
<td>'Ama 'u</td>
<td>Endemic</td>
<td></td>
</tr>
<tr>
<td>Goodeniaceae</td>
<td><em>Scaevola procera</em> Hillebr.</td>
<td>Naupaka kuahiwi</td>
<td>Endemic</td>
<td></td>
</tr>
<tr>
<td>Poaceae</td>
<td><em>Schizachyrium condensatum</em> , <em>Andropogon spp.</em> (Kunth) Nees</td>
<td>Bush Beard Grass</td>
<td>Naturalized</td>
<td></td>
</tr>
<tr>
<td>Selaginellaceae</td>
<td><em>Selaginella arbuscula</em> (Kaulf.) Spring</td>
<td>Lepelepe a moa</td>
<td>Endemic</td>
<td></td>
</tr>
<tr>
<td>Cyatheaceae</td>
<td><em>Sphaeropteris cooperi</em> (Hook. ex F.Muell.) R.M.Tryon</td>
<td>Australian Tree Fern</td>
<td>Naturalized</td>
<td></td>
</tr>
<tr>
<td>Gleicheniaceae</td>
<td><em>Sticherus owhyhensis</em> (Hook.) Ching</td>
<td>‘Uluhe</td>
<td>Endemic</td>
<td></td>
</tr>
<tr>
<td>Myrtaceae</td>
<td><em>Syzygium sandwicense</em> (A.Gray) Müll.Berol.</td>
<td>‘Ōhi’a hā</td>
<td>Endemic</td>
<td></td>
</tr>
<tr>
<td>Ericaceae</td>
<td><em>Vaccinium calycinum</em> Sm.</td>
<td>‘Ōhelo</td>
<td>Endemic</td>
<td></td>
</tr>
<tr>
<td>Ericaceae</td>
<td><em>Vaccinium dentatum</em> Sm.</td>
<td>‘Ōhelo</td>
<td>Endemic</td>
<td></td>
</tr>
<tr>
<td>Flacourtiaceae</td>
<td><em>Xylosma Hawaiianse</em> Seem.</td>
<td>Maua</td>
<td>Endemic</td>
<td></td>
</tr>
<tr>
<td>Rutaceae</td>
<td><em>Zanthoxylum dipetalum</em> var. dipetalum</td>
<td>Kāwa‘u</td>
<td>Endemic</td>
<td></td>
</tr>
</tbody>
</table>

**Key**
SOC – Species of Concern (Fed)
E – Endangered (Fed)
PEP – Plant Extinction Prevention Program (State)

### 7.3 Fauna (mammals, amphibians, reptiles, invertebrates)

There have been no recent surveys of the site for mammals, amphibians, reptiles and invertebrates. However, a DLNR survey (DLNR 1997) carried out prior to construction of the nearby Kalalau Rim Endangered Plan Exclosure, encountered feral pigs, Black-tailed Deer, feral goats, feral cats, black rat, Norway rat, Polynesian rat and the house mouse.

The surveyors also noted that the ‘ōpe‘ape‘a is known to occur 1km to the southwest of the site at the Hawai‘i Air National Guard Radar Station and likely also resides in the forest surroundings. They further hypothesized at the time that the introduced Metallic skink (*Leiolopisma metallicum*) inhabits the area and the introduced wrinkled frog (*Rana rugose*) may inhabit the small drainages.
7.4 ‘A’o – Newell’s Shearwater

The ‘a’o, or Newell’s Shearwater, is endemic to Hawai‘i, with Kaua‘i supporting the largest breeding population, estimated at 75 to 90% of the total world population (Ainley et al. 1995, USFWS 2011).

The species is listed as:

- ‘Threatened’ under Federal and State of Hawai‘i Endangered Species laws

Figure 7.1. The ‘a’o. N Banfield.

The birds are nocturnal and ground nesting, breeding in burrows in steep, high elevation terrain. Their preferred habitat is open native forest dominated by ‘ōhi‘a lehua (Metrosideros polymorpha) with a dense understory of ‘uluhe fern (Dicranopteris linearis). Breeding begins in early April, when birds return to search for nest sites (Ainley et al. 1997, Zaun 2007, Deringer and Holmes 2009, Raine et al. 2017f, d, g, e). In June, the female lays one egg, which hatches in approximately 60 days. After hatching, both parents take turns to make foraging trips to the ocean to provision chicks. Fledging occurs late September to mid-November, peaking in October (Raine et al. 2017f). Fledglings will remain at sea for the next several years, returning to their natal areas to prospect for nesting sites in years two to five, and breeding by years five or six (Ainley et al. 1997). The ‘a’o exhibits high site and mate fidelity.

The population of ‘a’o is estimated to have declined by 94% (at an average rate of ~13% per year) from 1993-2013 (Raine et al. 2017b) and is predicted to continue to decline (Griesemer and Holmes 2011). The restriction of the species’ breeding range on the island is predicted to continue (Day et al. 2003, Holmes et al. 2009, Raine et al. 2017b).
Factors contributing to this decline are principally the effects of collisions with utility structures, fallout from the effect of light attraction and predation at breeding colonies by non-native predators (Raine et al. 2017a, Raine et al. 2017b, Raine et al. 2017f, d, g, e, Raine et al. 2017h). Other threats include climate change which can affect ocean conditions and food availability (Oro 2014).

### 7.5 Other Avifauna

DLNR surveyors in 1997 noted the Koloa or Pacific Golden Plover (*Pluvialis dominica*), pueo and the nēnē or Hawaiian Goose (*Branta sandvicensis*) in the vicinity of the site.

During a site visit and forest bird point counts in 2016 and 2017, KSHCP and KESRP staff observed i’iwi (*Drepanis coccinea*) (a candidate for federal listing under the ESA), ‘apana (*Himatione sanguinea*), Kaua‘i ‘elepaio (*Chasiempis sandwichensis*), Kaua‘i amakihi (*Hemignathus Kaua‘iensis*) and ‘anianiau (*Magumma parva*). ‘Anianiau and Kaua‘i ‘amakihi were observed singing which may be an indication of breeding in the area.

The forest bird breeding season is from Jan – Jun, with most nests being high in the tops of trees. The pueo breeding season and population status is not fully understood but nests have been found throughout the year. Nests consist of simple scrapes in the ground (often under dense vegetative cover) lined with grasses and feather down (DLNR 2015).

Further surveys will be carried out in spring 2018 to complete a baseline of presence and nesting.

### 7.6 Listed Species

The following listed species are known to be present at the KSHCP mitigation site (Table 7.2).

**Table 7.2. Listed species and Federal Species of Concern known to be present at the site.**

<table>
<thead>
<tr>
<th>Species Common Name</th>
<th>Scientific Name</th>
<th>Confirmed Present</th>
<th>State Status</th>
<th>Federal Status</th>
<th>IUCN Status</th>
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<tr>
<td>Plants</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>‘Ohe‘ohe</td>
<td>Polyscias flynnii</td>
<td>V</td>
<td>Endangered, PEP</td>
<td>Endangered</td>
<td>Critically Endangered</td>
</tr>
<tr>
<td>Kōlea, (Rock) Hosaka</td>
<td>Myrsine knudsenii</td>
<td>V</td>
<td>Endangered, PEP</td>
<td>Endangered</td>
<td>Endangered</td>
</tr>
<tr>
<td>Heau</td>
<td>Exocarpos luteolus</td>
<td>V</td>
<td>Endangered</td>
<td>Endangered</td>
<td>Critically Endangered</td>
</tr>
<tr>
<td>‘Akoko</td>
<td>Euphorbia remyi var.</td>
<td>V</td>
<td>Endangered</td>
<td>Endangered</td>
<td>Critically Endangered</td>
</tr>
<tr>
<td>N - CONFIDENTIAL</td>
<td>D – CONFIDENTIAL (outside fence)</td>
<td></td>
<td>Endangered, PEP</td>
<td>Endangered</td>
<td>Critically Endangered</td>
</tr>
</tbody>
</table>
8. **SEABIRD STUDIES ON SITE – KAHUAMA‘A SEABIRD PRESERVE**

8.1 Kaua‘i and the Kahuama‘a Seabird Preserve – Background to Site Selection and Role in ‘A‘o Conservation

The island of Kaua‘i is critically important for meeting recovery and conservation goals for the ‘a‘o as it supports up to 90% of the world population (Spear et al. 1995, Ainley et al. 1997).

The Kaua‘i Endangered Seabird Recovery Project (KESRP) conducted auditory surveys and identified the ridges and slopes along the northwest coast of Kaua‘i as displaying the highest levels of ‘a‘o and ‘ua‘u breeding activity. These areas are known as ‘polygons’ or ‘calling hotspots’ (Figure 7.2) (Banfield et al. 2013, Raine et al. 2017f, d, g, e). This work helped to focus a search for a suitable SAS on the Kalalau Valley area which has high levels of activity, is relatively easy to access and is on land belonging to the state.
KESRP conducted a series of surveys within and along the rim of the Kalalau Valley from 2006 to 2016 (Raine and Holmes, unpub. data), the results of which contributed heavily to the final selection of the site for the Seabird Preserve. Survey results identified 26 seabird polygons within 3km of the social attraction site, with the nearest polygon only 210 m away (Figure 7.3).

In addition, a song meter recording unit was installed on June 1, 2016 by KESRP staff to record ‘a’o and ‘ua’u activity (AUD 1: UTM 0434363 E, 2449690 N). The device was recovered on July 7th, 2016. Data was analyzed by KESRP and Conservation Metrics. ‘A’o calls were detected almost nightly throughout the survey duration, with a site call rate of 0.3 calls/minute. This call rate is almost an order of magnitude lower than rates detected within a large monitored ‘a’o colony in Upper Limahuli Preserve but is roughly comparable to lower-activity sites in Pohakea.

Although call rates were low at the survey site, compared to large monitored colonies of this species on Kaua’i (such as Upper Limahuli Preserve), the fact that they were recorded on almost all nights suggests that potentially, a small number of pairs are breeding within or near to the site itself. The results also indicate that individual birds are flying around the area vocalizing on most nights, which could be drawn in by social attraction. Based on years of surveys by KESRP,
it is clear that the wider area (Kalalau Valley and Nā Pali coast) has large breeding populations of both species (as seen in Section 6.2 and 6.3). Thus there are potential source colonies nearby that could be attracted into the site itself through social attraction (Raine et al. 2016).

Only 6 ‘ua‘u calls were recorded by the song meter. No barn owl calls or ‘akē‘akē calls were recorded.

![Figure 7.3. Map of location for the Kahuama‘a Seabird Preserve showing ‘hotspot’ polygons for the Covered Seabirds in surrounding area.](image)

As a mitigation project for incidental take of ‘ā‘o by KSHCP participants, the Kahuama‘a Seabird Preserve will play an important part in protecting the species over the 30-year lifespan of the project. The habitat in the area is already of high quality for the species and management action at Kahuama‘a will optimize this habitat. The site will become a stronghold for Newell’s by providing a predator proof sanctuary, enhancing reproductive success. Moreover, the remote northwest region of the island offers an opportunity to conduct conservation away from the threats of light attraction and utility line collisions. Kahuama‘a is
known to be relatively free of artificial light both at the site and also on the flyway to and from the ocean.

It should be noted that in 2015, a light attraction event resulted in a large number of downed seabirds at the Kōke‘e Airforce base (Raine 2015a, Raine et al. 2015). The Air Force has since signed an agreement with USFWS to minimize lights at this base during the seabird season, and to monitor for any fallout that may occur.

8.2 KSHCP Studies

On the basis of KESRP findings in the broader Kalalau valley area, further work was undertaken at the Kahuama’a Seabird Preserve by the KSHCP team. In 2016 and 2017, preliminary auditory surveys were conducted to assess flyover patterns and confirm any seabird activity in and around the site, including any ground calling activity. The objective of auditory surveys is not to obtain an exact estimate of the number of seabirds breeding or present within the survey, but to generate average call rates to allow for a quantitative estimate of the species in comparison with other survey areas.

2016

Fourteen surveys in four locations were carried out for ‘a‘o from May 31 to June 3, 2016 by KSHCP staff. Data recorded included presence of birds calling on the ground with distance to the observer, presence of birds transiting over the site with elevation and distance and number of calls over time. The surveys followed a standardized protocol developed in 2006 by KESRP (see Appendix 1), such that the KSHCP data will serve as a baseline, compatible with KESRP data across years and sites.

For ‘a‘o, the surveys found that no evidence of ground activity at the site itself (birds being present on the ground may be indicative of burrows nearby) but did record ground calling at a distance of approximately 200m. Birds were detected transiting over the site, which indicates a high potential for them to be attracted to playback. No burrows were found in the site but the survey did not include a specific search for burrows. Continuous calling by ‘a‘o was recorded at a distance of >500m within the Kalalau Valley, corroborating some of the KESRP polygons in the area (Figure 7.3), and confirming presence of ‘a‘o in densities that could serve as source colonies for the site. The maximum number of ‘a‘o calls detected in one survey was comparable to KESRP observations at Wainiha which is noted as a ‘Medium-activity site’ with “ground calling or other signs of potential nesting behavior detected” (Raine and Banfield 2015).

2017

Six surveys in two locations were carried out from August 28-30. Since the proposed fence location has changed since 2016, only one survey site was repeated and the other survey location covered a location within the new fenceline. The majority of the calls recorded came from outside the project site, confirming presence of NESH in densities that could serve as source colonies for the proposed social attraction project. When data for calls within the site itself (0-200m range) was analyzed separately, the ‘calls per hour average’ was, as expected,
low. Nonetheless, almost 200 calls were recorded in one session within this distance bracket, indicating a good number of birds circling or transiting over the site. This is encouraging, suggesting that the site is in an excellent location to attract prospecting birds once social attraction commences. In addition, several calls were heard that might have indicated ground calling, although these calls were not persistent enough to confirm the presence of breeders on site.

The presence of barn owls during three separate sessions indicates that barn owl control is likely to be of great importance at the site once social attraction starts as these introduced birds are known to be aerial predators of Newell’s Shearwaters.

The results of the surveys, combined with the KESRP acoustic monitoring survey indicate that the installing a social attraction site at Kahuama’a has a high likelihood of success due to the presence of transiting birds, the presence of ground calling birds in the near vicinity and the fact that nearby source colonies have a suitable density of ‘a’o which will supply new birds to the site.

Note that the social attraction component of the management plan will not be targeting ‘ua’u directly because the applicants for the light attraction HCP have very low numbers of incidental take for ‘ua’u which are being mitigated for by barn owl control in the Kalalau Valley. However, if ‘ua’u choose to breed in the site, it will be an added conservation benefit.
9. OBJECTIVES

The objectives of the Kahuama’a Seabird Preserve mirror those of the KSHCP in Table 9.1.

<table>
<thead>
<tr>
<th>Objective</th>
<th>Activity</th>
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</thead>
<tbody>
<tr>
<td>2.A. Construct a predator-proof fence and install social</td>
<td>2.A. Construct a predator-proof fence and install social attraction equipment (nest boxes, speakers) within</td>
</tr>
<tr>
<td>attraction equipment (nest boxes, speakers) within the fenced area at</td>
<td>the fenced area at the mitigation site in Year 1 of KSHCP implementation.</td>
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<td>the mitigation site in Year 1 of KSHCP implementation.</td>
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<tr>
<td>2.B. Remove predators from within the fenced enclosure with monitoring</td>
<td>2.B. Remove predators from within the fenced enclosure with monitoring confirmation of their absence, and</td>
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<tr>
<td>confirmation of their absence, and activation of the social attraction</td>
<td>activation of the social attraction equipment by Year 2; predator eradication within fenced enclosure</td>
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<tr>
<td>equipment by Year 2; predator eradication within fenced enclosure</td>
<td>maintained for the life of the project.</td>
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<td>maintained for the life of the project.</td>
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<tr>
<td>2.C. Ground activity by Covered Seabirds documented at the mitigation</td>
<td>2.C. Ground activity by Covered Seabirds documented at the mitigation site by Year 4 of KSHCP program</td>
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<tr>
<td>site by Year 4 of KSHCP program implementation.</td>
<td>implementation.</td>
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<tr>
<td>2.D. Breeding activity by Covered Seabirds documented at the mitigation</td>
<td>2.D. Breeding activity by Covered Seabirds documented at the mitigation site by Years 5-7 of KSHCP</td>
</tr>
<tr>
<td>site by Years 5-7 of KSHCP program implementation.</td>
<td>program implementation.</td>
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<tr>
<td>2.E. Cumulative upward trend in Covered Seabird breeding</td>
<td>2.E. Cumulative upward trend in Covered Seabird breeding documented at the mitigation site by Years 10-12</td>
</tr>
<tr>
<td>documented at the mitigation site by Years 10-12 of KSHCP program</td>
<td>of KSHCP program implementation.</td>
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<tr>
<td>implementation.</td>
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<tr>
<td>2.F. Continued cumulative upward trend in Covered Seabird breeding</td>
<td>2.F. Continued cumulative upward trend in Covered Seabird breeding documented at the mitigation site by</td>
</tr>
<tr>
<td>documented at the mitigation site by Year 20 of KSHCP program implementation.</td>
<td>Year 20 of KSHCP program implementation.</td>
</tr>
<tr>
<td>2.G. Maintain high quality seabird habitat at the mitigation</td>
<td>2.G. Maintain high quality seabird habitat at the mitigation site by removal of habitat modifying invasive</td>
</tr>
<tr>
<td>site by removal of habitat modifying invasive plants in Year 1 and</td>
<td>plants in Year 1 and annually throughout the 30-year duration of the KSHCP.</td>
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<td>annually throughout the 30-year duration of the KSHCP.</td>
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</tr>
<tr>
<td>2.H. Protect nesting birds inside mitigation fence and in nearby source</td>
<td>2.H. Protect nesting birds inside mitigation fence and in nearby source colonies by implementing predator</td>
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<tr>
<td>colonies by implementing predator control of 1) barn owls within the</td>
<td>control of 1) barn owls within the area surrounding the fenced enclosure and the Kalalau Valley, and 2)</td>
</tr>
<tr>
<td>area surrounding the fenced enclosure and the Kalalau Valley, and 2)</td>
<td>feral cats at ingress points to source colonies in the Kalalau Valley, beginning in year 1 and annually</td>
</tr>
<tr>
<td>feral cats at ingress points to source colonies in the Kalalau Valley,</td>
<td>throughout the 30-year duration of the KSHCP.</td>
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<td>beginning in year 1 and annually throughout the 30-year duration of the</td>
<td></td>
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<tr>
<td>KSHCP.</td>
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</tbody>
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10. ACTIVITIES

10.1 Activities Overview

Achieving the objectives of the Kahuama’a Seabird Preserve will require a series of actions over the duration of the project (30 years). For each specific activity within the Management Plan,
the activity and methodology is described in the following sections. The approximate chronology of actions is as follows:

- Obtain permits
- Final confirmation of fence alignment
- Pre-construction surveys
- Fence Construction
- Predator Eradication
- Commence social attraction at site
- Vegetation management (invasive species removal)

Monitoring at the site will be ongoing and is a critical part of project success. All data will be collected digitally in the field to facilitate swift analysis into a database at the office. The Project Manager and Technician will work together to analyze data, produce appropriate monitoring documents and carry out all project management activities. Section 17 outlines the Best Management Practices (BMPs) that will ensure that listed and / or rare species are not compromised by any of the activities.

**10.2 Obtain Permits**

Permits from the relevant authorities should be obtained in advance and will be outlined before the project begins. Permits may be required as follows:

<table>
<thead>
<tr>
<th>Action</th>
<th>Permit / Permission</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fence construction and habitat enhancement</td>
<td>Develop MOA and secure any related approvals from DLNR</td>
</tr>
<tr>
<td>Invasive plant removal and pest control</td>
<td>Secure permits as required from DOA, USDA, USFWS and DLNR</td>
</tr>
<tr>
<td>Research and monitoring</td>
<td>Secure permits as required from DLNR and USFWS</td>
</tr>
<tr>
<td>All</td>
<td>NHPA Section 106 and ESA Section 7 consultation as required</td>
</tr>
</tbody>
</table>

**10.3 Fence Alignment and Pre-Construction Surveys**

**OBJECTIVE 2A** – Construct a predator-proof fence and install social attraction equipment (nest boxes, speakers) within the fenced area at the mitigation site in Year 1 of KSHCP implementation.

**10.3.1 Initiate Bids Process. Select and Hire Contractor**
The relationship with the fence contractor is extremely important to ensure that Best Management Practices are followed during construction and that the outcome of a terrestrial predator-free enclosure is successfully achieved. As soon as the IE takes over management of the Kahuama’a Seabird Preserve, a fence contractor with a proven track record, capable of working in the terrain, will be engaged through a bids process.

10.3.2 Establish Sling Load Drop Zones, Final Fence Alignment

The chosen contractor will meet on site to establish the final fence alignment and sling load drop zones with IE staff, the regulatory agencies and any other stakeholders considered necessary.

Following the onsite meeting, a document will be drawn up with a map showing the exact location of the fence and sling-load drop zones. The contractor will be asked to commit in writing to this document.

10.1.1. Pre-construction Surveys

Prior to work commencing on site, a series of surveys will be carried out and the results used to guide construction work and to ensure that all damage to listed species is completely avoided. These surveys are detailed in the following sections.

- Burrow surveys – Section 12.3.1
- Auditory survey – Section 12.3.4
- Bat survey – Section 17.1.3
- Candidate and listed forest bird & pueo survey – Section 7.5 & 17.1.4
- Archaeological survey – Section 17.1.6
- Plant Survey – Section 12.2

10.4 Fence Construction

OBJECTIVE 2A – Construct a predator-proof fence and install social attraction equipment (nest boxes, speakers) within the fenced area at the mitigation site in Year 1 of KSHCP implementation.

In order to establish a safe breeding sanctuary for the Covered Seabirds, a predator-proof fence will be constructed on site as follows.
10.4.1 Fence Design

Figure 10.1. Technical Drawings of the Fence and Pedestrian Gate (PRC 2017)

The fence (Figure 10.1) will enclose approximately 2ha and will incorporate the following characteristics or similar (Young and VanderWerf 2014):

- Height of 2m
- All fence materials made of the same material (stainless steel)
- The fence base or frame should be constructed using 2.7m long posts spaced at approximately 2m intervals along the fence length. Spacing in areas of high winds along ridge lines should be closer
- Stays (diagonal braces placed behind the posts at a 45° angle) should be used on average every 4 posts and every 2 posts in high wind areas and on steep slopes. Stays must be placed only on the inside (pest-free) side of the fence.
- Stainless steel single strand wires should be tensioned to 150kg horizontally between the posts or poles and be fixed to each pole or post using stainless steel fastenings.
- Fine-aperture mesh will be applied that will exclude any terrestrial animal larger than a 2-day-old mouse. The face of the fence and the horizontal skirt extending out from the base of the fence should be marine grade “316” stainless steel mesh with an aperture no larger than 7mm by 25mm. The mesh should be fixed to the posts and post framework using stainless steel fittings.
- A mesh skirt will be added extending out and down approximately 0.5m to prevent digging, secured to the ground with pins or cement and not loose in any location, with its leading edge covered with topsoil or filled to a depth of approximately 45cm, and not scoured out or eroded under in any way.
- Rolled hood will be added to allow animals to escape the enclosure, but not to jump inside. The hood should be of the same material as the rest of the fence and should be braced with brackets at each post and fixed to the fence frame using stainless steel fittings.
- The area immediately outside of the fence (i.e., the pest side) should be completely free of any objects or structures within two meters of the fence at all heights that an animal could use as a base for jumping over the fence.
- The main body of the fence should be constructed in such a way that there are no gaps wider than 7 mm to exclude juvenile mice.
- No fence corner should turn more sharply than 45 degrees off the line of the previous fence section (Figure 10.2).

Figure 10.2. Fence corner diagram

- Single, half-door design lockable pedestrian access gate will be located along the fence edge nearest to the road, not at ground level, requiring stepping over to reduce the chance of predators entering if the gate is accidentally left open (Figure 10.3). Gate sealed to the main body of the fence in a pest proof manner with no gaps greater than 7mm along more than one dimension, with a mesh skirt or solid concrete footing beneath the gate entrance that extends out from the gate by no less than 350mm.
- An extra 5% of materials has been included in the budget to serve as “overage” in case there is variance from the estimated fence length or damage to some materials during transport. The extra materials also can be used for repairs after construction is complete.
- This design minimizes the risk of reinvasion as long as monitoring and maintenance procedures are in place (Day and MacGibbon 2007).
10.4.2 Earthworks (Young and VanderWerf 2014)

- The fence platform should be formed as a gentle mound (when viewed in cross-section) so that drainage water cannot pass through the line of the fence.
- The earthworks and substrate in and around the fence should not have any channels or gaps continuously greater than 7mm across more than one dimension that extends from the ground surface on the outside (pest side) of the fence to the ground surface on the inside of the fence.
- The fence platform and ground conditions in the vicinity of the fence should be such that there is no immediate risk of slumping or erosion that may cause damage to the fence or compromise any of the standards outlined above.

### 10.4.3 Fence Construction Methods

Fence construction will ensure that the risks of predator incursion are minimal. Constructions will consist of:

- Fencing material will be flown in and landed on the agreed upon sling load drop zones (see section 10.3.2). Fence contractor will agree to a timetable for completion and all BMPs in writing.
- Clearing of fence-line (removing vegetation from a 4m wide swath, with machinery if possible or else by hand with chainsaws / hand tools) following the BMPs outlined in section 17.1 and 17.2.
- Removal and maintenance of all woody vegetation from the outside the fence line to a distance of 3.7m to prevent incursion from predators. This may be less where there is an upwards slope away from the fence. Rats have a horizontal jumping capacity of 3.66m and a vertical jumping capacity of 1.8m (L. Young, 2017, pers. comm.). Grass may remain.
- Fence platform formation (earthworks, drainage works and culverts) with use of heavy equipment, such as a bobcat, if possible.
- Base fence erection (installation of posts, anchor poles, braces, 5 base wires);
- Attachment of mesh (including ground pinning/cementing);
- Attachment of cat-proof hood sections;
- Installation of waterway and access components.
- Removal of all waste upon completion.
- Due to the presence of tall canopy forest surrounding the fence, a solar powered tree fall response system (a metal wire that sits above the hood and is triggered if a branch falls on it) will be included in the fence construction process.

### 10.4.4 Delays in Fence Construction

Fence construction delays could result in additional costs. Some delays are avoidable; for example, in the case of permits, the KSHCP team will work with the agencies in advance, on the basis of the management plan, to ensure that the agencies issue permits before work commences and that any problems are flagged by the agencies early enough to be solved.

Fence construction must start during the period December to April, i.e. outside the breeding season. Fence construction may only commence during this period if it is reasonable to expect that the work that would affect seabirds will be completed on the sloping sections of the fenceline before the seabird breeding season commences, namely vegetation clearance, installation of initial posts and other ground disturbing work.
However, work may continue into the breeding season to complete the fence provided it is either on the flat areas of the site or does not include work noted above that would damage potential burrows or birds in burrows.

Since this means that missing the appropriate window could result in a delay of a year, the fence contractor will be asked to commit to deadlines such as ensuring that materials are in place in advance (see section 10.4). The contract will stipulate per-day monetary penalties beyond the specified deadline for contractor delays, regardless of weather. Intensive efforts will be made by the IE to avoid delays.

10.4.5 Confirm Fence Construction Complete

The target for completion of fence construction is end of Year One to fulfil KSHCP requirements. IE staff will confirm that this target has been met with a final fence inspection including photographs.

If it becomes clear during the course of construction that this target will be missed, IE staff will consult regulatory agencies and initiate adaptive management (outlined in section 16) if required.

10.4.6 Long term Fence Monitoring and Maintenance

Even a well-built predator exclusion fence using proven materials will require a regular monitoring and maintenance program to be effective in the long term. Accidents, vandalism, and acts of nature are likely to damage the fence at some point, potentially resulting in pest reinvasions. A good maintenance and monitoring program will detect the damage quickly, will have people and resources in place to make emergency repairs, and will reduce the likelihood of animals entering when a breach occurs (Young and VanderWerf 2014).

Maintenance will be carried out as follows:

- The contractor will be required to provide a complete parts list, including item description, material, manufacturer and part number in a spreadsheet.
- They should also provide a written maintenance manual, repair kit parts list and one day of on the ground training for managers and staff.
- Based on discussions with other predator fence project managers, annual maintenance cost for materials is estimated to be 1% of the initial cost of the fence, plus labor.
- The fence will be monitored bi-monthly (this can be combined with other monitoring activities, such as predator control) following completion to avoid fresh incursions by predators. Personnel will check for holes, breaches, vandalism, and other damage throughout the life of the project. Ad hoc monitoring will occur after storm events or high winds to ensure no damage was sustained. Gates will be tested for functionality.
- When inspecting, there are four components to look at: hood, posts and stays, skirt and mesh. The hood should be examined for excess lichen growth which can facilitate cats climbing over, corrosion at seams, attachment points, bends and for scratches indicative
of cats attempting to jump over. If scratches are noticed, the area should be examined to determine if there are jump points. Posts and stays should be examined for corrosion and loose attachments. Mesh should be examined for breaks in welds or links, corrosion or abrasion and separation at the seams or attachment points. The skirt should be examined to ensure that there aren’t any punctures, it is secured to the ground, not eroded underneath and that the lip is not curling up and allowing pests to dig under.

- Where scratches are seen, feral cat trapping outside the fence will be intensified (see section 11.1.2)

- A risk analysis will be carried out after construction, to identify possible areas of weakness. This analysis should identify possible reinvasion sites, such as at natural barriers like adjacent overhanging trees, steep slopes, areas prone to high winds or rock falls, or areas where public might try to access.

- To assist in having breaches reported in a timely manner, signs could be placed at high-risk areas and access points that provide contact information for whom to call in the event that a breach is noticed. Fence posts will be tagged with a unique number so that anyone reporting a breach can identify the location easily (e.g. fence panel #180). These can either be engraved into the fence posts, or added as separate metal tags.

- All project staff will carry a small tool box of patch materials and tools at all times during site visits.

10.5 Intruder Detection

Predator intrusions will be identified through the regular deployment of tracking tunnels inside of the fence line. See rodent removal section 11.1.1.

10.6 Predator Defense Zone Around Fenceline

To reduce the likelihood of pests entering through a fence breach, a zone of low, non-woody vegetation will be created and maintained around the perimeter of the fence. Predator eradication will also occur in this zone (and up to 50m beyond) because several species, particularly feral cats, have been noted using a fenceline as a transit trail within their territory (A. Raine, 2017, pers. comm.) and regularly patrol it, increasing their chances of finding a breach before it is repaired. See rodent and feral cat removal section 11.1.1 and 11.1.2.

10.7 Fence Crisis Response to Reduce or Eliminate the Risk of Predator Incursion

A tree fall response system will be installed along the fence which will issue an alert to a mobile phone if the fence is damaged by falling vegetation.

Following such an alert or a storm event and / or hurricane, staff will check the fence as soon as practically possible (ideally within 2 hours, if safe to do so). If a major breach is discovered, e.g. a tree falling on the fence and / or the fence being blown down or partially destroyed by a hurricane, staff will initiate a ‘fence crisis procedure’ as follows:
• Upon discovery of a major breach or serious damage, IE staff will alert the regulatory authorities (DOFAW, DLNR, USFWS) and the KSHCP participants
• Where possible and safe to do so, staff will make an effort to repair the breach themselves for damage limitation
• Where the breach is too large, staff will retain the services of a fence contractor as soon as practically possible to repair the breach.
• If the breach occurred outside the breeding season for covered seabirds, staff will deploy ink card tracking tunnels, visual surveys and cameras to assess the likelihood of predators having entered the Kahuama’a Seabird Enclosure. If predators are found to be present, IE staff will initiate the predator removal procedures outlined in this management plan in section 11.
• If the breach occurred during the breeding season, IE staff will initiate the predator removal procedures immediately to avoid injury or death to the covered seabirds.
• IE staff will also check and repair any damaged artificial burrows following a storm event, as well as the social attraction equipment, cameras, Goodnature (or similar brand) traps and any other hardware relevant to the site.
• The KSHCP includes a contingency fund to pay for incidents of this nature. IE staff will draw upon the fund as required to repair the breach.

11. OPERATION OF PROJECT SITE

11.1 Predator Eradication at Project Site

OBJECTIVE 2.B. Remove predators from within the fenced enclosure with monitoring confirmation of their absence, and activation of the social attraction equipment by Year 2; predator eradication within fenced enclosure maintained for the life of the project.

There are many precedents for successful predator removal in fenced seabird enclosures. In Hawai‘i, these include the Nihoku Ecosystem Restoration Project at Kilaeua Point National Wildlife Refuge in Kaau‘i in 2015, Makamaka‘ole Seabird Preserve in Maui in 2013 and Ka‘ena Point Natural Area Reserve on O‘ahu in 2011.

Kahuama’a Seabird Preserve, predator eradication will target rodents, namely Black rat, Norway rat and Polynesian rat. House mouse is likely to be eradicated as part of the process. It will also target feral cats, ungulates, pigs (although these are expected to leave of their own accord due to the levels of disturbance during construction) and barn owls.

11.1.1 Rodent Eradication Methods

Predator removal will be achieved through a grid of mechanical trapping (rodent snap traps, self-resetting rodent Goodnature traps or similar brand) and stationary rodenticide (diphacinone) bait stations. Monitoring will include the counting and collection of carcasses, monthly deployment of ink card tracking tunnels which show predator footprints, camera
monitoring and bait-take monitoring (this is dealt with in section 12.1). Eradication within the fence is expected to take 3 months (Young et al. 2013) but may be longer.

There will also be a secondary line of rodent removal defense just outside the project fence in a 50m predator defense zone consisting of Goodnature (or similar) and snap traps which will remain there permanently. This will help to prevent the ingress of rats and mice into the site by removing them before they reach the fence; research suggests that reinvasion by rodents occurs within 24 hours of a breach (Connolly et al. 2009).

Project staff will be trained by predator eradication experts based on Kauai. To remove rodents inside the fence enclosure, trained and certified technicians will set up the following grids using a GPS:

**Self-resetting rat traps (Goodnature A24 traps or similar)**

These traps house a captive-bolt system in a narrow opening, positioned vertically to the ground. These traps result in almost instant euthanasia, and can remove multiple rats between servicing.

- Goodnature traps will be set along the fence, spaced every 50m along the fence- the average home range size for Black Rats ((Young et al. 2012) - on a grid inside the fence, mounted on trees or roots. If no other support is available, a pole can be used. Traps will be at least 12cm off the ground. They will remain for the duration of the project.
- Traps will be checked monthly, strike counter noted, CO₂ canister tested and changed if required and trap re-baited if necessary. Check frequency may be reduced over time if the automatic lure pump proves effective.
- For further set up and management details see [http://www.goodnature.co.nz/support](http://www.goodnature.co.nz/support). Similar brands may also be used.

**Enclosed rat “snap” traps (Victor, DOC 250 or similar)**

- Inside the fence, a grid of up to 75 “snap traps” or similar (placed inside a bird-safe housing to prevent non-target capture) may be set up (if needed depending on predator level) with 50 spaced approximately every 25m inside the fence and 40 in the 50m predator defense zone outside the fence.
- These will be used throughout the initial eradication (expected to last three months) and then may be removed except in case of a reinvasion by predators and stored by project.
- Options include the Victor Rat Traps and the DOC250.
Tupperware boxes can be used with holes cut in the side of them to exclude birds from the traps, based on a design by Kyle Pias.

- While in use during initial eradication, traps will be checked every two days, carcasses removed and disposed of off-site and bait replaced if required.

Figure 11.1. Bird Excluding Box for DOC 200 Snap Traps from Makamakaʻole Project, Maui

**Rat bait stations.**

Rodent bait stations will be placed inside the fence. Stations are designed to prevent access by birds or non-target species.

**Interior rat bait stations**

- A grid of approximately 50 tamper-resistant Protecta® plastic bait stations or similar will be placed every 25m inside the fence, secured to the ground with metal rebar stakes and plotted by GPS.
- Stations will be baited with 11 1oz Ramik mini-bars® containing 0.005% diphacinone or similar product approved for conservation of endangered species (Young et al. 2013).
- For the initial bait application, stations will be re-baited twice a week for one month. In month two, stations will be baited once per week; in month three to six, stations will be baited every two weeks; thereafter, stations will be baited once a month until sign disappears (by zero bait take or teethmarks and zero presence on ink cards).
- Bait take ‘hot spots’ will be mapped, where additional trapping / baiting would be of benefit.
- Once ink card tracking tunnels and bait stations show zero signs of take, predator eradication work and monitoring will continue for a further three months (the average reproductive cycle of a female rat) to ensure that a new litter did not survive. Detailed records of the level of bait take for each station will be kept.
- Bait stations may be re-utilized at any time during the project based on a suspected breach or rodent evidence found via tracking tunnels, cameras, or other detection methods following the above protocol until rodent signs disappears. They will therefore remain in place even when not in use.
- Baiting will be done by staff certified as applicators of restricted-use rodenticide.
• Signs indicating diphacinone bait is being used will be placed on the pedestrian entrance to the fenced area.

Even when rodent eradication inside the predator-proof fence is complete, permanent rodent control (snap traps in bird excluding boxes and Goodnature traps or similar) immediately outside the fence will be maintained (traps left out and maintained) to keep animal densities low and prevent immigration into the fenced area.

To facilitate rapid response to a breach, unarméd snap traps and unbaited bait stations will remain in situ inside the fence so that they can be easily redeployed in an emergency.

11.1.2 Feral Cat Eradication, Biosecurity Methods Inside Kahuama’a Seabird Preserve Fence

It is anticipated that feral cats (*Felis catus*) will leave the interior area prior to completion of the fence, due to the disturbance caused by construction activities. This will be confirmed by the deployment of 2 live traps and 5 camera traps inside the enclosure for three months or until social attraction commences (these cameras will later be used for burrow monitoring). If needed, removal can be completed by spotlighting at night using a firearm or high-powered air rifle.

11.1.2.1 Feral Cat Reinvasion

If cats are detected inside the predator proof enclosure after completion, through any means (for example visually, on a camera or through the appearance of a bird carcass that is likely to have been killed by a feral cat, scat, footprints or other signs), they must be urgently removed, following strict BMPs (see Section 17). A trapping protocol to be determined by the Prime Contractor will be implemented until the area is cat-free.

11.1.2.2 Feral Cat Control Methods (outside fence)

Feral cats are observed on the road to Pihea by NARS staff on a near-weekly basis, and NARS camera data reflects significantly higher numbers of cats moving along trails and fence lines than along densely vegetated areas (K Pias, 2017, pers. comm.). It is worth noting that a predated ‘a’o was documented in 2014 in very close proximity to the Kalalau Lookout (A. Raine, 2016, pers. comm.).
At the Makamaka’ole Seabird Preserve, cats were noted prowling the exterior of the fenceline, apparently attracted by seabird calls played on the speaker (S. Engler, 2017, pers. comm.). This presents a risk of reinvasion by cats in the event of a breach and also an opportunity to remove cats which might prey on neighboring source colonies. Therefore, feral cat control along the fenceline will be carried out as follows:

Live feral cat traps
- Live feral cat traps (30” and 36” Tomahawks or similar) will be deployed around the fence. These will be a mixture of baited traps and un-baited trail set traps (double door tomahawks). Traps will likely be equipped with monitoring technology that sends a text or video notification when a trap is triggered.
- Traps will be locked open in place with added bait between trapping efforts to encourage regular visitation by cats. This technique has been observed to greatly increase capture rates (G. Reid, 2016, pers. comm.).
- Cameras will be used outside the fence to monitor for cat presence (see section 11.1.1 for methods)

11.1.3 Mongoose

The establishment of Indian mongoose (Herpestes javanicus) is uncertain on the island of Kauai (Phillips and Lucey 2016). Two mongoose have been caught on Kaua’i in recent years and Kaua’i Invasive Species Committee (KISC) receives multiple “credible” sightings annually. If a mongoose is detected or suspected at the site at any time, the project team will advise the regulatory agencies and seek advice from KISC within 12 hours of the animal being detected and will reiniate the baiting and trapping protocol.

11.1.4 Ungulates and Pigs

Site visits during the project development stage have indicated a high degree of goat disturbance, as well as some pig sign. Black-tailed deer may also be present. However, due to the relatively small size of the enclosure, a need for feral pig, feral goat and deer trapping is not anticipated as large ungulates typically avoid the kind of loud human disturbance that will occur during construction.

Scheduled fence monitoring and maintenance (Section 10.4.6) will ensure any ungulate or pig fence damage is noted and repaired.

Scheduled camera checks for cats and rats (Section 11.1) will ensure that any ungulate or pig presence inside the fence is noted. In the highly unlikely event that an ungulate or pig is found inside the enclosure, a firearm-certified technician will be remove them as soon as practically possible. Snares / legholds may be deployed if necessary.
11.2 Barn Owl Control

Objective 2.H. Protect nesting birds inside mitigation fence and in nearby source colonies by implementing predator control of 1) barn owls within the area surrounding the fenced enclosure and the Kalalau Valley, and 2) feral cats at ingress points to source colonies in the Kalalau Valley, beginning in year 1 and annually throughout the 30-year duration of the KSHCP.

Barn owls are a non-native species and known predators of seabirds (Thomsen and Kroeger 2015, Raine et al. 2017c). They cannot be completely excluded from the reserve as they are aerial predators and their home ranges can vary considerably in size from 1.5km² to 31km² depending on habitat and prey availability (Martin et al. 2014). Therefore, barn owl reduction methods will be deployed in and around the site to ensure that seabirds are not predated at the preserve. This predator control will begin in Year 1 and is expected to continue for the 30-year duration of the Program. The barn owl control will enhance adult survivorship and the reproductive success of ‘a’o, ‘ua’u and ‘akē’akē breeding in the affected area (USFWS 2017b).

This is particularly the case for those populations nesting along the Nā Pali Coast such as Honopu Valley (where large numbers of ‘a’o are known to nest) and along the Pihea side of the Kalalau rim (where large numbers of both ‘a’o and ‘ua’u are known to nest (Raine et al. 2016)).

‘Akē’akē have also been documented vocalizing from cliff bands within the Kalalau Valley and are present in large numbers in the slot canyons of the Nā Pali coast, including nearby Honopu (KESRP, unpublished data). While they are not expected to breed in the social attraction site, they will benefit from barn owl control as, based on evidence from Lehua Island monitoring by KESRP and the propensity of barn owls to be attracted to ‘akē’akē calls in Kaua’i, they are likely to be heavily impacted by this predator. An ‘akē’akē predated by a barn owl was found in nearby Nuaolo Aina in 2014 (A. Raine 2017 pers. comm.).

Once an individual or a mating pair of barn owls are removed, new individuals will move into the territory over time. Observers in nearby locations on Kaua’i have noted a lapse of about 3-12 months between removal of original individuals from a territory and detections of new individuals (G. Reid, 2016, pers. comm.). This underscores the need for ongoing control.

11.2.1 Barn Owl Reduction Methods – Trapping

- 6 Bal-chatri prey traps or Swedish Goshawk-style trap will be employed outside the enclosure approximately 4 nights per month or as needed at various points along the Kalalau Rim. These points will be moved as required.
- The owls will be electronically lured into the area using owl or prey calls. Traps may be baited using decoys (a moving toy and playback to mimic the presence of a mouse/rat, or with a live rat/mouse). When the owl pounces on the Bal-chatri trap to get at the decoy, their talons will become entangled in the snares set on top of the trap and the trapped owl dispatched humanely.
• Traps will be set at night and closed each morning to ensure humane treatment of both bait and potential target species, and to ensure that non-target species (such as pueo) can be safely released if caught.
• Trapping will continue for the 30-year duration of the project, and may be modified to utilize technologies that become available over the term of the project.

11.2.2 Barn Owl Reduction Methods – nighttime shooting

• Aerial control will occur 4 nights per month or as-needed (as determined by auditory surveys and field observations) for the duration of the 30-year Program at locations based on auditory data and visual sightings.
• Timing will be at and just after sunset, and at or just prior to sunrise, subject to change based upon observed activity patterns, moonlight hours, and weather patterns (barn owls head back to dry roosts during heavy rains). Total hunt times should average 5 hours per night but may vary depending on barn owl activity.
• Barn owls will be lured to the area using playback (such as the noise of a squeaking mouse or an ‘akē’akē call). Predator control staff will be trained by KESRP staff to distinguish between non-native barn owl and the native pueo. They will also be well-versed in seabird identification. Shooting will only occur when a 100% positive ID has been achieved. If seabirds or pueo are in the immediate environs, no shooting will occur.
• Barn owls will first be spotlit. One person will operate a spotlight, while the other will operate a shotgun with an effective radius of ~37m. Staff will listen and visually scan the area using single-tube night-vision goggles. When spotted, one person will illuminate the individual with a spotlight while the other person confirms the identification and then dispatches the barn owl.
• Traps and shooting locations will be a minimum distance of 50m from all public facilities (parking lots, trails, roadways, and facilities), operating only during dark hours (sunset to sunrise). All shotgun shells will be retrieved after shooting and non-lead ammo will be used. Areas will be checked for human presence prior to shooting. If members of the public are present, shooting operations will be stopped immediately.
• If a barn owl is detected outside of planned trapping periods, a rapid response contingency plan will be in place, and the individual(s) will be hunted on the same night if possible or as soon as practically possible.

11.3 Feral Cat Removal at Ingress Points to Source Colonies in the Kalalau Valley

Objective 2.H Protect nesting birds inside mitigation fence and in nearby source colonies by implementing predator control of 1) barn owls within the area surrounding the fenced enclosure and the Kalalau Valley, and 2) feral cats at ingress points to source colonies in the Kalalau Valley, ongoing throughout the 30-year duration of the KSHCP.
Feral cats are using the roads and trails in the vicinity of the Kahuama’a Seabird Preserve as ingress points to prey upon nearby established colonies in the Kalalau Valley and Rim, Pihea (part of the Hono O Nā Pali NARS) and Honopu, expected source populations for the Kahuama’a Seabird Preserve. Feral cats are having a very serious negative effect on fledging success in these areas - KESRP have recorded numerous incidents of cats eating fledglings and a cat kill of an ‘a‘o was recorded at a parking area near the Honopu colony, which is close to the Kahuama’a Seabird Preserve (A. Raine, 2017, pers. comm.). Data from cameras and predation records at various colonies in Kaua‘i show that a cat that is targeting seabirds can predate a series of burrows in a single night, killing multiple adult and juvenile seabirds (A. Raine, 2017, pers. comm.).

The Kahuama’a Seabird Preserve Management Plan therefore includes feral cat removal at ingress points to source colonies in the Kalalau Valley. This will include at least 2km of linear trapping lines off roadways between the Kalalau and Pu‘u O Kila lookouts, as well as trapping lines along likely cat trails into neighboring colonies and ad hoc trap placement as appropriate based on camera data.

This predator control effort will reduce the impact of feral cat predation on source colonies for the Kahuama’a Seabird Preserve by removing individual cats that are migrating towards the colonies, and reducing feline breeding in the area. It will also serve as a line of defense, removing cats which might attempt to enter the Kahuama’a Seabird Preserve.

This action will begin in Year 1 and is expected to continue for the 30-year duration of the Program.

### 11.3.1 Feral Cat Removal Methods

Feral cats will be targeted as follows:

**Live feral cat traps**

- Feral cat traps (30” and 36” Tomahawks or similar) will be deployed at least 10 nights a month. These will be a mixture of baited traps and un-baited trail set traps (double door tomahawks) and will be spaced approximately every 100m along at least 2km of trap lines from Kalalau Lookout to Pu‘u O Kila Lookout and along likely cat trails into neighboring colonies. Using camera data as a guide, a further 10 live cat traps may be used in a roving capacity for maximum efficacy.

- Live traps will be locked open in place with added bait between trapping efforts to encourage regular visitation by cats. This technique has been observed to greatly increase capture rates (Reid 2016 pers. comm.). Traps in public locations will be removed or hidden between trapping efforts to avoid vandalism. However, their locations can still be baited with cat lure between trapping efforts to encourage habitual visitation by cats and increase trapping success when they are reopened.
Conibear feral cats traps:

- Conibear traps (with appropriate seabird excluding box) will be deployed approx. 150m apart along trapping lines, with an additional 10 being used in a roving capacity. Harm to seabirds will be prevented by mounting the traps in boxes and setting them approximately 20-25cm off the ground. Boxes will be cut in half so the bait is visually attractive to predators. Conibear trap baits will alternate between food-based, glandular, and olfactory lures. Traps will be checked and rebaited twice a month.

Leg Holds:

- 20 Leg holds may be deployed as “blind” sets, i.e. not baited and set in a manner that requires little behavioral modification on the part of the target animal. Traps will only be set on trails / locations where a feral cat has been observed during the previous week, and when there is imminent danger to seabirds from a feral cat, and when regular manual or continuous wireless monitoring is available. They will be deployed well away from any established tourist areas or trails.

Camera Traps

- Camera traps will be used to monitor trails for predator activity. Camera monitoring provides managers with data on the number and distribution of cats present, allowing them to make informed management decisions on the placement and types of traps to use at particular times. 20 cameras will be set at various locations on the 2km of feral cat removal trails, as well as other ingress points to provide observations on feral cats, including the exact time an animal is seen and the direction it is headed. The data from each trail camera will be collected and photos will be checked approximately every two weeks. All data will be reviewed in the field, and notable photos stored.

- Recent advances allow traps to be equipped with cameras and radio transmitters, advising technicians by text when the traps are triggered and showing the predator caught. This technology saves a great deal of staff time and reduces human presence and scent along trails. If used, the budget for monitoring cameras for feral cats will be partially transferred to this technology.

Additional Protocols

- Other traps may be used as appropriate, particularly if new technology becomes available.
- In public use areas, care will be taken to place all traps out of the way, hidden within vegetation.
- Feral cat carcasses may be necropsied and stomach contents examined for evidence of seabird predation.
- If a feral cat is detected outside of planned trapping periods, the next trapping period will be brought forward to start as soon as practically possible.
- Non-target pest species (e.g. rats) that are caught in the live traps will also be dispatched.
- Technicians will receive firearm training to dispatch trapped animals humanely.
All predator control activities performed by IE staff will include the necessary training and permitting.

11.4 Creation of Social Attraction Site

<table>
<thead>
<tr>
<th>2.A.</th>
<th>Permanent, predator-proof fence constructed and social attraction equipment (nest boxes, speakers) installed at the mitigation site in Year 1 of KSHCP program implementation.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.B.</td>
<td>Predators removed from within fenced enclosure with monitoring confirmation of their absence, and activation of the social attraction equipment by Year 2; predator eradication within fenced enclosure maintained for the life of the project.</td>
</tr>
<tr>
<td>2.C.</td>
<td>Ground activity by Covered Seabirds documented at the mitigation site by Year 4 of KSHCP program implementation.</td>
</tr>
<tr>
<td>2.D.</td>
<td>Breeding activity by Covered Seabirds documented at the mitigation site by Years 5-7 of KSHCP program implementation.</td>
</tr>
</tbody>
</table>

Establishing a seabird breeding colony in a terrestrial predator free fence enclosure through the broadcasting of breeding calls is an effective and proven conservation tool (Gummer 2003, Sawyer and Fogle 2010, McIver et al. 2016). Seabirds, especially prospectors, transiting to and from their natal colonies, are drawn to the apparent activity at the site and, when they choose to breed there, are protected by the predator proof fence, increasing their breeding and fledging success considerably (Young et al. 2012).

An integral part of best management in a social attraction site is the provision of artificial burrows to optimize seabird habitat (Bourgeois et al. 2015) and expedite the process of establishing breeding at a new site - burrow excavation by a newly established breeding pair can take a year or more (Bancroft et al. 2004). Artificial burrows are used in almost all the successful social attraction sites documented in the literature. Not only does this increase the likelihood of earlier success at the social attraction site and increase the density of nesting pairs in an area (Podolsky and Kress 1992), it also makes the monitoring of nests much easier and less likely to cause disturbance to burrows and birds. Since monitoring of nests and nesting success is an important part of mitigation for the KSHCP, artificial burrows are key in this project. Since the vegetation understory at the site is already damaged and disturbed in the areas where burrows will be installed, the installation of artificial burrows will not affect a pristine habitat, based on observations by botanists at the site, who noted high levels of invasive species in the understory and little ground cover. It should be noted that other areas at the site provide excellent habitat for natural burrows. Artificial burrows will be located in two main areas (Figure 11.2).
11.4.1 Social Attraction – Call Broadcast Methods

The social attraction element of the Kahuama’a Seabird Preserve will be implemented as follows:

- Two speaker systems will be installed and maintained (the location is shown in Figure 11.2), consisting of 2 or 4 (as required) weatherproof, omni-directional outdoor speakers, mounted on the fence and / or poles inside the fence line and powered by 12v sealed solar powered batteries (see an example from New Zealand, Figure 11.3).
- Digital recordings will be obtained of ‘a’o colonies taken within 2km of the site. Recordings will be of multiple birds (simulating a large colony) and using a complete set of typical colony sounds to attract the most birds (Podolsky et al. 1998).
- The speakers will turn on at sunset and continue to play species-specific calls until sunrise, drawing prospecting birds to the site to establish nesting within the predator-free area. Broadcasting will be timed to begin with the first arrival and courtship dates.
(01 Apr) until the 15th Sep (by which time the majority of non-breeders have left the colonies (A. Raine, 2017, pers. comm.).

- Because the Covered Seabirds are nocturnal, decoys are not anticipated to be needed (Jones and Kress 2012); However, if additional conservation actions are needed to enhance productivity at the site (e.g. if there is no ground activity by year 3), custom fabricated decoys will be placed on the ground as was done at the Makamaka’ole Seabird Preserve social attraction site on West Maui (Wind 2014, USFWS 2016).

Figure 11.3. Social attraction speaker system and nest boxes at Hutton’s shearwater colony, Kaikoura, New Zealand. A. Raine

11.4.2 Social Attraction – Artificial Burrow Installation Methods

- The area for artificial burrows inside the Kahuama’a Seabird Preserve will be thoroughly searched for natural burrows (active or inactive) to prevent damage or destruction during artificial burrow installation (no surveys for burrows have been carried out to date).
- IE staff will be trained on burrow installation and operation.
- 100 artificial nest boxes will be purchased and installed. A proposed design is shown in Figure 11.4 but other alternatives will also be reviewed before purchase. Artificial burrows will likely consist of a box with a locking lid for convenient inspection and segments of drain pipe as the entry point.
- Two optimal locations (Figure 11.2) have been selected within the site based:
  - Slope - Shearwaters use wind and updrafts in addition to vigorous flapping to provide lift during takeoff (Elkins 1983, Yoda et al. 2017). A moderate to steeply sloped site greater than or equal to 29° facing into the prevailing winds (A. Raine, 2016, pers. comm.) is preferred to facilitate flight and landing. A sloping site far enough away from the lower fenceline (>50m) also helps prevent the risk of collisions with the fence during landing and take-off.
  - Low vegetation, such as grasses, which will facilitate installation of next boxes.
- Invasive vegetation will be removed (see Section 11.3 Vegetation Restoration and Monitoring).
• Each artificially installed burrow will be assigned a nest ID, be clearly marked, labeled and mapped using GPS.
• Wherever possible, artificial burrows should be shaded by vegetation (Carlile et al. 2012).

Figure 11.4. Possible design (by David Wingate) of artificial seabird burrow to be used

Figure 11.5. Vegetation and slope in the “bowl” section of the site, where part of the artificial burrows will be installed.

11.4.3 Social Attraction Site – Confirm Installation Complete

The target for the installation of social attraction equipment (playback speakers and nest boxes) is end of Year One to fulfil KSHCP requirements. IE staff will confirm that this target has been met with a final inspection and a report including photographs (presented in the annual report).
If it becomes clear during the course of construction that this target will be missed, IE staff will consult regulatory agencies and initiate adaptive management outlined in the KSHCP if required.

11.4.4 Social Attraction Site – Maintenance

Before the beginning of each breeding season, the social attraction site will be maintained as follows:

- Visually inspection of each burrow in Jan or Feb. Repair damaged burrows (old nesting material should be left in situ as a scent marker), ensure access.
- Test loudspeakers. After Year 4, test song meter / loud speaker alternation system.

11.5 Vegetation Management

OBJECTIVE 2G: Maintain high quality seabird habitat at the mitigation site by removal of habitat modifying invasive plants in Year 1 and annually throughout the 30-year duration of the KSHCP.

11.5.1 Background

The Kahuama’a Seabird Preserve predator proof fence is expected to benefit native vegetation and rare plants as they are currently being adversely affected by rats, pigs, goats and deer. The habitat at the site is dominated by native vegetation, but certain invasive plants are proliferating, especially within the understory. There is very little forest regeneration due to ungulate trampling and grazing, which is also encouraging swathes of thick, non-native invasive plants and grasses. Rat damage, consisting of chewing of stems, leaves, and fruit/seed predation has been observed at the site. Exclusion of these feral animals will have an immediate beneficial effect, especially when combined with the removal non-native invasive plants, some of which out-compete native plants in the understory and modify microhabitat suitable for seabirds.

Seabird habitat suitability mapping exercises consistently identify native vegetation as a critical component for successful nesting (Troy et al. 2014). Conversely, habitat modification by invasive plant species has been correlated with a reduction in seabird breeding. When compared to active breeding colonies, inactive breeding colonies were found to contain a higher proportion of non-native, invasive vegetation cover (Holmes and Troy 2008, Holmes et al. 2009). A suite of invasive plant species that have been identified as significant seabird habitat modifiers (Table 11.1) are present at the Kahuama’a Seabird Preserve.
Table 11.1. Seabird Habitat Modifiers

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strawberry Guava</td>
<td><em>Psidium cattleianum</em></td>
<td>1</td>
</tr>
<tr>
<td>Himalayan (Kahili)</td>
<td><em>Hedychium gardnerianum</em></td>
<td>1</td>
</tr>
<tr>
<td>Ginger</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Australian Tree Fern</td>
<td><em>Sphaeropteris cooperi</em></td>
<td>1</td>
</tr>
<tr>
<td>Blackberry</td>
<td><em>Rubus argutus</em></td>
<td>2</td>
</tr>
<tr>
<td>Banana Poka</td>
<td><em>Passiflora tarminiana</em></td>
<td>2</td>
</tr>
<tr>
<td>Bush Beard Grass</td>
<td><em>Schizachyrium condensatum,</em></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td><em>Andropogon spp.</em></td>
<td></td>
</tr>
<tr>
<td>Koster’s curse</td>
<td><em>Clidemia hirta</em></td>
<td>2</td>
</tr>
<tr>
<td>Daisy Fleabane</td>
<td><em>Erigeron karvinskianus</em></td>
<td>3</td>
</tr>
<tr>
<td>Air Plant</td>
<td><em>Kalanchoe pinnata</em></td>
<td>3</td>
</tr>
</tbody>
</table>

This list may be expanded during the project if new and important invasive seabird habitat modifiers are discovered in the area.

Vegetation work on site will focus on three key areas:

- Eradication or effective suppression of seabird habitat modifiers, focusing particularly on priority 1 & 2 species.
- Vegetation management during construction and operation of the fence (along fenceline and around artificial burrows and speaker system)
- Monitoring of vegetation to ensure that habitat quality targets are being met across the site.

It is important to note that the primary purpose of the Kahuama’a Seabird Preserve is to fulfil the obligations of the KSHCP by providing mitigation for take of the Covered Seabirds. The key requirement towards this process is the removal of seabird habitat modifiers and monitoring to ensure that the habitat remains suitable for seabird breeding.

To ensure that listed plants are not harmed during management on site, detailed BMPs have been prepared (see section 17).

Outplanting of rare species within the preserve is not in the remit of this management plan. Nonetheless, the Preserve presents an opportunity for other entities to outplant rare species on the flatter areas that will be protected within the predator proof fence and the regulatory authorities (USFWS and DLNR) have expressed strong support for this. In addition, this will be the first predator proof fence constructed on Kaua‘i in an area that is primarily native habitat. This provides an opportunity to study forest and ecosystem response to removal of rats and ungulates, and to the influx of seabird derived marine nutrients. The IE will seek partnerships with universities and other interested research organizations who may desire to capitalize such opportunities.
11.5.2 Eradication / suppression of seabird habitat modifiers

Vegetation work at the Kahuama’a Seabird Preserve will focus primarily on removing invasive plants that negatively affect the ability of seabirds to nest (see Table 11.1 - Seabird Habitat Modifiers). Non-native vegetation can impede breeding activities such as take-off and landing, prospecting, courtship and burrow excavation. For example, fast growing Strawberry Guava (*Psidium cattleianum*) thickets reduce the burrowing habitat available (Penniman 2010, VanZandt et al. 2014) and their fruit have a synergistic interaction with non-native mammals (Nogueira-Filho et al. 2009). Plants such as Himalayan (Kahili) Ginger (*Hedychium gardnerianum*) and Blackberry (*Rubus argutus*) can also form a dense thicket of roots and stands that prevents burrow excavation; Australian Tree Fern (*Sphaeropteris cooperi*) outcompetes native plants that shade burrows and provide shelter from predators, and can rapidly take over entire hillsides; and Banana Poka (*Passiflora tarminiana*), Bush Beard Grass (*Schizachyrium condensatum*, *Andropogon spp.*), Koster’s Curse (*Clidemia hirta*), Daisy Fleabane (*Erigeron karvinskianus*) and Air Plant (*Kalanchoe pinnata*) form mats that might impede take-off and landing or have spikes which deter birds from the area.


For the 30-year duration of the Program, IE staff will remove habitat modifying plants (Table 11.1) from within the fence enclosure, with the goal of removal of habitat modifying invasive plants in Year 1 and annually throughout the 30-year duration of the KSHCP (ingress of these species will be ongoing due to the seedbank / seeds blowing in from outside the fence).

11.5.2.1 Methods

- The presence, location and abundance of the above seabird habitat modifiers will be mapped prior to removal using GPS and GIS. The priority one species (Strawberry Guava, Himalayan (Kahili) Ginger and Australian Tree Fern) are the most important to remove as they are likely to be the most damaging for seabirds.
- An initial removal effort will occur in a one-time targeted event during fence construction, carried out by a suitably qualified contractor. All three priority species will be targeted in this first pass, but subsequent maintenance will focus on priority 1 & 2 species first.

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3 There is some taxonomic confusion about these species in Hawai‘i; they are frequently misidentified and can co-occur. Ecologically they are, however, similar with regard to their invasion biology. (A Williams, 2017, pers. comm.)
• For all plants, both for removal method as well as maintenance (except for blackberry), hand pulling for small/young individuals will often be the first method, with chemical used on larger plants that can’t be hand pulled. As the project goes on, the use of chemicals will decline, with hand pulling increasing, as long as regular maintenance is occurring and new weeds are being found when still in seedling stage. **Table 11.2** gives more detail on different methods for each modifier.

• During the initial removal of seabird habitat modifiers, groundcovers and low grasses will be left to reduce erosion.

• If appropriate, biodegradable erosion control cloths and / or weed control cloths will be laid down during the phase where large areas of non-natives are removed. The Kōkeʻe Resource Conservation Program has found this to be more cost effective than weeding afterwards (K. Cassel, 2017, pers. comm.)

• The entire site will be monitored annually for seabird habitat modifiers in **Table 11.1**. See **Section 11.3**.

• Additional removal and ongoing control of seabird habitat modifiers will then occur annually, outside the breeding season according to **Table 11.2**, with additional spot treatments carried out based on ad hoc sightings of concern. Technicians will also look for new species of concern. If found, a suitable eradication plan will be drawn up and carried out.

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**Table 11.2. Seabird Habitat Modifiers, Removal Methods, Maintenance and Harm Avoidance**

<table>
<thead>
<tr>
<th>Seabird habitat modifier</th>
<th>Scientific Name</th>
<th>Removal Method</th>
<th>Maintenance</th>
<th>Harm Minimization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strawberry Guava</td>
<td><em>Psidium cattleianum</em></td>
<td>Trees “frilled” (notched girdling technique). Fill cuts with Garlon application using lab squirt applicator bottle / brush or use tool to pry strawberry guava &lt; 2.5cm in diameter out of ground.</td>
<td>Drizzle spray Garlon on reemerging plants (TNC, 2015) (Trees currently not in large groves)</td>
<td>1) Careful application with squirt bottle or brush in dry weather only 2) no herbicide use with 10m of rare / listed plants or burrows 3) To be carried out by trained staff not volunteers 4) staff to be aware that Myrsine knudsenii might be mistaken for Strawberry Guava 5) No trees above 4.6m will be cut during bat pupping season June 1 – Sept 15.</td>
</tr>
<tr>
<td>Himalayan (Kahili) Ginger</td>
<td><em>Hedychium gardnerianum</em></td>
<td>Manually cut and spot-treat with Escort using a cut stump technique with a lab squirt applicator bottle Pull out small shoots. Cut larger shoots and treat with Escort using lab squirt bottle (ginger mainly at edges of site and not currently in large clumps)</td>
<td></td>
<td>1) Careful application with squirt bottle or brush in dry weather only 2) no herbicide use with 10m of rare / listed plants or burrows 4) to be carried out by trained staff not volunteers</td>
</tr>
<tr>
<td>Australian Tree Fern</td>
<td><em>Sphaeroptera cooperi</em></td>
<td>Manually remove by chopping with a machete and crushing the apical meristem</td>
<td>Should not resprout but follow up removal will be required due to presence of spores and new individuals</td>
<td></td>
</tr>
<tr>
<td>Banana Poka</td>
<td><em>Passiflora tarminiana</em></td>
<td>Manually remove by pulling up with roots</td>
<td>Entire vine will die from uprooting but seeds are long-lived so ongoing uprooting required.</td>
<td></td>
</tr>
</tbody>
</table>
11.5.3 Vegetation Management during Construction and Operation of the Fence

There are three main actions in this project that will require the removal and / or ongoing control of vegetation:

- Fence construction
- Maintenance of a 4m zone outside the fence that is free of woody vegetation (this is within, but not the same as, the predator defense zone).
- Installation of artificial burrows and speaker system

### 11.5.3.1 Methods

<table>
<thead>
<tr>
<th>Species</th>
<th>Common Name</th>
<th>Management Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blackberry</td>
<td>Rubus argutus</td>
<td>Manually cut and treated with Garlon cut stump treatment. Foliar applications Garlon or Imazpyr. Follow up will be required as blackberry will come back if not maintained. Manually cut and treat with cut stump treatment. Foliar applications Garlon or Imazpyr. 1) Careful application with squirt bottle or brush in dry weather only 2) no herbicide use with 10m of rare / listed plants or burrows 4) when plant is killed, dead stalks will be left in situ to inhibit growth of other invasive species and reduce removal effort 5) erosion / weed control cloths may be required. 4) to be carried out by trained staff not volunteers.</td>
</tr>
<tr>
<td>Bush Beard Grass</td>
<td>Schizachyrium condensatum, Andropogon spp.</td>
<td>Spray application of Roundup Pro. Manually cut and treated with Garlon cut stump treatment. 100% of seedling need to be killed to eradicate population so maintenance will be indefinite (DeWalt 2006). 1) Careful application with squirt bottle or brush in dry weather only 2) large areas could be removed a little at a time and / or erosion / weed control cloths may be required 4) no herbicide use with 10m of rare / listed plants or burrows 5) to be carried out by trained staff and not volunteers.</td>
</tr>
<tr>
<td>Koster’s Curse</td>
<td>Clidemia hirta</td>
<td>Manually cut and treat with Garlon cut stump treatment. Attempt not to spread seeds during cutting. Manually cut and treated with Garlon cut stump treatment. 100% of seedling need to be killed to eradicate population so maintenance will be indefinite (DeWalt 2006). 1) Careful application with squirt bottle or brush in dry weather only 2) every effort to control spread of seeds such as seed collection during cutting, black bagging immediately rather than carrying in open off site 3) erosion / weed control cloths may be required 4) no herbicide use with 10m of rare / listed plants or burrows. 5) to be carried out by trained staff and not volunteers.</td>
</tr>
<tr>
<td>Daisy Fleabane</td>
<td>Erigeron karvinskianus</td>
<td>Manual Removal. Foliar applications Garlon. Manual Removal. Foliar applications Garlon. 1) Careful application with squirt bottle or brush in dry weather only 2) every effort to control spread of seeds such as seed collection during cutting, black bagging immediately rather than carrying in open off site 3) erosion / weed control cloths may be required 4) no herbicide use with 10m of rare / listed plants or burrows. 5) to be carried out by trained staff and not volunteers.</td>
</tr>
<tr>
<td>Air Plant</td>
<td>Kalanchoe Pinnata</td>
<td>Foliar application of Roundup. Manual removal and bagging. Foliar application of Roundup. Manual removal and bagging. 1) every effort to control spread of seeds such as seed collection during cutting, black bagging immediately rather than carrying in open off site Leaves will need to be bagged too, each leaf can produce several individuals 2) erosion / weed control cloths may be required.</td>
</tr>
</tbody>
</table>
Following fence construction, restoration within the fence terrestrial predator defense zone will be carried out by means of replanting appropriate native grass and / or Aalii (*Dodonea viscosa*) to prevent the regrowth of seabird habitat modifiers. Alternatively, DOFAW has been looking into a ‘low growing and low maintenance slurry’ (W. Kishida, 2017, pers. comm.) made up of native ferns and grasses for use along road ways where a high incidence of nēnē ‘take’ happens. The slurry is still in development, but might be an option along the fence by construction. All planting will be vulnerable to grazing and trampling by pigs, goats or deer (A Williams, 2017, pers. comm.) but these options offer the best possibility of establishing some cover.

No woody vegetation higher than 0.5m will be allowed to grow within the 4m zone along the fence line, to prevent reinvasion by predators. The height of vegetation will be kept low by means of trimming, scything, mowing or any other appropriate methods. Loose logs and vegetation will be moved off the mesh skirt area to prevent rodents using logs etc. as a solid edge to dig against (Day and MacGibbon 2007).

Control of seabird habitat modifiers will be important in the cleared area outside the fence to ensure that this area does not become an ingress point for invasive plants. This will be carried out using the methods outlined in Table 11.2. Staff will conduct a monthly walk through of the zone (in conjunction with efforts to keep vegetation below 0.5m above) and conduct simplified veg plots (5 plots of 3x3m where the % of seabird habitat modifiers only is assessed) to confirm that the percentage of modifiers is not increasing.

In the case of the artificial burrows, after installation it is expected that native vegetation will regenerate naturally. If this does not occur, or if seabird habitat modifiers invade the area, weeding (see Table 11.2) and / or outplanting will be considered. Vegetation will be managed to shade burrows to prevent heat stress to the seabirds. This may include some planting.

### 11.5.4 Targets for Removal of Habitat Modifiers

Objective 2G (Maintain high quality seabird habitat at the mitigation site by removal of habitat modifying invasive plants in Year 1 and annually throughout the 30-year duration of the KSHCP.) requires targets in order to measure success. These are shown in Tables 11.3 and 11.4.
Table 11.3: Targets for Removal of Seabird Habitat Modifiers

<table>
<thead>
<tr>
<th>Action</th>
<th>Target Year 1</th>
<th>Target Year 5</th>
<th>Target Year 10</th>
<th>Target Year 15</th>
<th>Target Year 20</th>
<th>Target Year 30</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of Tier 1 &amp; 2 seabird habitat modifiers removed across site (vs baseline)</td>
<td>≤50% cover</td>
<td>≤20% removed</td>
<td>≤5% cover of these species</td>
<td>≤5% cover of these species</td>
<td>≤5% cover of these species</td>
<td>≤5% cover of these species</td>
</tr>
<tr>
<td>% of Tier 1 &amp; 2 invasive plants per veg plot</td>
<td>Target to be set once baseline established</td>
<td>Target to be set once baseline established</td>
<td>Target to be set once baseline established</td>
<td>Target to be set once baseline established</td>
<td>Target to be set once baseline established</td>
<td>Target to be set once baseline established</td>
</tr>
</tbody>
</table>

Note – Tier 3 Habitat Modifiers will be removed time permitting or if they are found to be affecting the burrowing ability of seabirds.

11.3.1 Consideration of PEPP and Endangered Plants

There are several PEPP and Endangered Plants at the site as shown in Table 7.1. However, extensive discussion and site visits with USFWS and DOFAW botanists has confirmed that the only plant that might be considered at risk from construction and operation is E. remyi var. remyi. Section 17, Best Management Practices, describes how damage will be completely avoided for this plant in particular as well as other PEPP and Endangered Plant species.

12. MONITOR EFFECTIVENESS OF KAHUAMA’A SEABIRD PRESERVE & FERAL CAT / BARN OWL CONTROL AS MITIGATION FOR TAKE OF ‘A’O

Effectiveness monitoring at the Kahuama’a Seabird Preserve will be carried out by the IE. Monitoring is intended to ensure that the objectives of the Kahuama’a Seabird Preserve and thus the KSHCP are met. Effectiveness monitoring will cover three main areas:

- Monitoring that predators have been removed and do not reinvade the site
- Monitoring barn owl Control
- Monitoring that Seabird Habitat Modifiers have been removed / suppressed
- Monitoring the Response of Covered Seabirds to management actions (Predator Removal, Vegetation Management and Social Attraction Components).
To assist with monitoring to ensure that objectives 2, C, D, E and F have been met, these are further defined in Table 12.1.

### Table 12.1: Definitions of KSHCP Objectives.

<table>
<thead>
<tr>
<th>Objective</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.C. Ground activity by Covered Seabirds documented at the mitigation site by Year 4 of KSHCP program implementation.</td>
<td>Ground activity is defined as presence of one or more ‘a’o individuals on the ground within the project enclosure as documented by an observer or a Reconyx camera trap. “Presence” includes guano, feathers, ground calling bird heard by observer / captured on camera and confirmed as being within the fence, as well as physical sightings.</td>
</tr>
<tr>
<td>2.D. Breeding activity by Covered Seabirds documented at the mitigation site by Years 5-7 of KSHCP program implementation.</td>
<td>• Egg, chick, or incubating adult noted within the site&lt;br&gt;• Breeding attempts in natural or artificial burrows are observed (such as copulation, digging a burrow, entering the burrow with nesting material, sitting in the burrow).&lt;br&gt;• Signs of digging/trampling, feathers, guano, or an egg shell&lt;br&gt;• Evidence of predation or nest failure</td>
</tr>
<tr>
<td>2.E. Cumulative upward trend in Covered Seabird breeding documented at the mitigation site by Year 10-12 of KSHCP program implementation.</td>
<td>Increased number of active burrows (artificial or natural) compared to years 5-7</td>
</tr>
<tr>
<td>2.F. Continued cumulative upward trend in Covered Seabird breeding documented at the mitigation site by Year 20 of KSHCP program implementation.</td>
<td>Increased number of active burrows (artificial or natural) compared to years 10-12</td>
</tr>
</tbody>
</table>

### 12.1 Monitoring of Predator Removal

#### 12.1.1 Monitoring of Rodent Removal

Rodent removal will be monitored as follows:

- **Camera Traps**: predators will be monitored using 10 remote camera traps (Reconyx or similar) placed strategically at known ingress routes, along trails, along interior fencelines and at other appropriate locations. Camera will be checked monthly during initial eradication (more frequent checks make camera failure more likely). After rat eradication is completed in year one, cameras will be moved to focus on seabird ground.
and burrow activity, but will still be able to pick up any predator activity. They will be checked monthly at this point.

- **Ink-card tracking tunnels**: 25 tracking tunnels will be set out on a 50m transect (Gillies 2013). They will be placed on flat ground with the ends unobstructed, baited with a peanut butter lure (see snap traps) and monitored for three nights. This will be repeated bi-monthly until technicians feel confident that rodent eradication has been achieved (no rodent sign for one month). Thereafter, they will be deployed once a month for one night during breeding season (Apr to Dec). If reinvasion is suspected, the tunnels can be redeployed at any time.

- If, after the initial rodent eradication, **rat signs are noted again** on the ink card tracking tunnels, snap traps and stationary bait boxes (if necessary) will re-deployed, until all signs of rodents inside the fence cease. If rodenticide is considered necessary, it will be used for the minimum time possible.

- **Formal routine fence checks** will be carried out to discover potential biosecurity breaches monthly but technicians will also check fence while rebaiting traps outside the fence and in the course of other duties. In the case of a reinvasion, a more thorough fence check will be carried out to determine the ingress point of the predators and necessary maintenance action taken to prevent further breaches. Detailed records will be kept of breaches and reinvasion records. Technicians will also look for collision events (feathers, carcass).

- Goodnature traps have a counter (purchased as an add-on) which indicates the number of ‘firings’. They will be checked weekly during initial eradication to ensure they are working and monthly thereafter with results noted on iPad. However, it should be noted that traps can fire on their own (e.g. through tree fall, wind etc.) so do not necessarily indicate the presence of predators. Where firings are noted, additional ink card tracking tunnels will be deployed and rat eradication action taken inside the fence. Similar brands can be used.

- Snap traps in a bird excluding housing will be checked daily during initial eradication to ensure they are working and remove any carcasses with results noted on iPad. They will remain in situ even when zero signs of rodents has been recorded for four weeks in case of reinvasion.

- Technicians will record and remove any carcasses from Goodnature (or similar) and snap traps daily during the initial eradication and weekly thereafter with results noted on iPad.

- Technicians will record number and species of predators present, location of predators and possible ingress pathways utilized, number of predators killed and caught by a monitored trap, fence integrity. Results noted on iPad.

- Monitoring frequency is summarized in Table 12.2.
Table 12.2: Summary of Predator Monitoring Frequency

<table>
<thead>
<tr>
<th>Biological Objectives</th>
<th>Monitoring Frequency During Normal Operation</th>
</tr>
</thead>
</table>
| 2.B. Remove predators from within the fenced enclosure with monitoring confirmation of their absence, and activation of the social attraction equipment by Year 2; predator eradication within fenced enclosure maintained for the life of the project. | - Camera traps checked monthly.  
- Monthly Goodnature check  
- Monthly ink-card tracking  
- Twice weekly snap trap checks 50m predator defense zone |

12.1.2 Cat Removal Monitoring at fenceline

Camera Traps
- Monitoring of cats will be ongoing using 4 camera traps along the fenceline, located on the outside of the fenceline, (in addition to the 20 burrow monitoring cameras around the project site. They can be moved as appropriate depending on trapping results, visual sightings and predation events. They will be checked monthly.

12.1.3 Barn Owl Control Monitoring

The objective of barn owl Control is to protect birds nesting inside the fence as well as in nearby source colonies. Complete eradication is not possible due to the propensity of new owls to fill an empty territory, however suppression of the population will have a beneficial effect. This objective will be monitored as follows:

- The technician will provide an annual report detailing how many barn owls were seen versus how many were shot during barn owl control operations (detailed in section 11.2). In addition, the technician will keep note of all ad hoc sightings of barn owls and Barn owl calls during the course of other duties.
- Predation events (presence of carcasses, camera sightings or visual sightings) by barn owls inside or adjacent to the fence will be documented (barn owls may carry carcasses outside the fence). If a predation occurs, additional barn owl control will be undertaken (more shooting and trapping nights) and new techniques will be investigated.

12.1.3 Feral Cat Control Monitoring

The objective of feral cat control is to protect birds nesting at nearby source colonies in the Kalalau Valley and to present the risk of reinvasion of cats into the predator proof fence. Complete eradication is not possible due to the propensity of new cats to enter the territory, however suppression of the population will have a beneficial effect. This objective will be monitored as follows:
• The technician will provide an annual report detailing how many feral cats were removed during control operations and where this occurred. In addition, the technician will keep note of all ad hoc sightings of cats (visually or on camera) during the course of other duties and will use both sets of information future feral cat removal work.
• Predation events by feral cats in the vicinity of the fence will be documented by project staff. In addition, managers of source colonies of the Kalalau Valley / Pihea / Honopu / Hono O Nā Pali) will be asked to supply data on predations in their area. If a predation occurs, additional feral cat control will be undertaken (more shooting and trapping nights) and new techniques will be investigated.
• Technicians will keep up to date on latest feral cat removal technology and employ new techniques as appropriate to increase efficiency.

12.1.4 Seabird Carcass Discovery

• Once seabird breeding is established, any bird carcasses found will be assessed for cause of death. Depending on the predator, the following action will be taken:
  o All: Camera traps will be checked to look for predators
  o Rodent: interior snap traps redeployed. Interior bait stations will be rebaited with diphacinone until all signs of predators (further deaths, ink-card tracking tunnels, camera sightings) end.
  o Feral cat: 8 live feral cat traps will be opened inside the fence. Firearm-certified technician will attempt to humanely remove feral cat with firearm. Fence will be checked for breaches.
  o Barn owl: additional shooting nights will be arranged as soon as practically possible after the discovery. New techniques will be investigated for barn owl removal.
  o Pig: firearm-certified technician will remove the pig

12.2 Monitoring of Vegetation Management

To ensure that the quality of native habitat remains optimal for seabirds (i.e. that basic structure of native vegetation is stable or improving and that the ingress of seabird habitat modifiers is not occurring), a vegetation monitoring project will be initiated.

12.2.1 Methods
• IE staff will be trained in plant identification
• A baseline plant inventory will be carried out by a suitably qualified consultant (with the assistance of IE staff for training purposes) within the fence line and 50m zone outside the fence to determine a plant inventory as a baseline (including status and abundance of each species) and species composition. The survey will also map the location of listed or rare plants to ensure their protection. This will take place before construction commences and will also cover the fenceline itself.
• Federally listed, endangered and threatened plants will be noted, flagged and mapped. This will be carried out by an appropriate consultant.
To monitor vegetation composition and change over time, a plant survey will be conducted every five years to document improvements in desired habitat conditions to maximize seabird production. This will be achieved by “broad brush” monitoring of five randomly selected vegetation plots (50m x 50m) inside the fenced enclosure (if a plot is selected in an area with a PEP or listed plant, or an area which is unsuitable for surveying due to steepness or safety concerns, another plot will be generated). Compass bearings will be used to ensure that the lines are straight.

The following data will be collected: Coordinates, dominant aspect, estimated slope, habitat classification (VI: Highest Quality Native Ecosystems; V2: Predominantly Native; V3: Considerably Disturbed; V4: Badly Degraded), Average Canopy Height Class. For the canopy and Understory, % Cover, % Native Species Cover, Max Height of Cover will be recorded. Bare ground will be recorded by %.

Within each 50m plot, two smaller random 2m² plots will be used to measure other vegetation (using a square of PVC pipes to form the size of the plot) in which the following will be monitored:
- native woody vegetation cover, tree density, and species richness
- seedling number, %, age class, stem diameter and cover
- presence, %, cover and composition of seabird habitat modifiers
- presence, % cover and composition of any other non-native species

DOFAW and PEPP already monitor listed and rare species on the site. This will remain in their remit. (It should be noted that some of the rare and listed plants on site are already in decline due to factors outside the control of the project such as insects, wood boring beetles etc.)

Targets in Table 12.3 will be set at the beginning of the project, once a baseline has been established.

<table>
<thead>
<tr>
<th>Action</th>
<th>Target Year 1</th>
<th>Target Year 5</th>
<th>Target Year 10</th>
<th>Target Year 15</th>
<th>Target Year 20</th>
<th>Target Year 30</th>
</tr>
</thead>
<tbody>
<tr>
<td>% and composition of native plants per veg plot</td>
<td>Target to be set once baseline established</td>
<td>Target to be set once baseline established</td>
<td>Target to be set once baseline established</td>
<td>Target to be set once baseline established</td>
<td>Target to be set once baseline established</td>
<td>Target to be set once baseline established</td>
</tr>
<tr>
<td>% and composition of seabird habitat modifiers per veg plot</td>
<td>Target to be set once baseline established</td>
<td>Target to be set once baseline established</td>
<td>Target to be set once baseline established</td>
<td>Target to be set once baseline established</td>
<td>Target to be set once baseline established</td>
<td>Target to be set once baseline established</td>
</tr>
<tr>
<td>Listed plants - damage from project</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 12.3: Targets for Vegetation Monitoring
12.3 Monitoring of Seabird Response to Management

Monitoring seabird response is a critical part of the social attraction site, not only to ensure that biological goals are met in terms of attracting the Covered Seabirds to breed and providing the right conditions to ensure breeding success, but also to fulfill the requirements of the KSHCP to provide mitigation for the take of these seabirds by KSHCP participants who are financing the project.

Effectiveness Monitoring will be carried out through the following means (listed in order of importance):

- Burrow Monitoring
- Camera monitoring
- Chick banding
- Auditory surveys with night vision
- Acoustic bird call monitoring (song meters)

The KSHCP supports the use of the best available, most cost-effective scientific tools and techniques for monitoring. Methods used may change based on new technological developments, site conditions and effectiveness in the field. For example, automated bird detection and monitoring technologies may be used to increase monitoring efficiency and accuracy. Any proposed changes will be discussed with the regulatory agencies in advance and with the KSHCP participants (and other stakeholders, if appropriate).

12.3.1 Burrow searching and monitoring

Burrow searching and monitoring of natural and artificial burrows is a critical part of seabird response monitoring. Technicians will search for burrows using established techniques outlined below. Once burrows are found, burrow checks will be undertaken to assess the status of any breeding attempts (e.g. is there an egg, chick or adult present). This data will be compared to data from the cameras to collect information which can be used to extrapolate results to unmonitored burrows on site.

Burrow monitoring fulfills, in part, Objective 2D – Breeding activity by Covered Seabirds documented at the mitigation site by Years 5-7 of KSHCP program implementation and Objective 2E &F – Cumulative upward trend in Covered Seabird breeding documented at the mitigation site by year 10-12 and 20.

12.3.1.1 Methods for locating and monitoring natural burrows

- Auditory surveys with night vision will occur twice a night for 4 nights per month (Jun – Aug) split over two observers (i.e. 2 nights a month each) to help guide burrow searching by indicating ground-calling hotspots.
• This will be supplemented with diurnal “cold searching” where staff actively search vegetation for burrow cavities with signs of seabirds (e.g., scent, feathers, guano, etc.). Burrow searching will happen a minimum of once a month for one day from Jun-Sep. (before incubation, burrow searching is too difficult due to a lack of clear signs of use, and requires unnecessary disturbance to vegetation). More searching could result in damage to vegetation.
• Active breeding can be distinguished from ground activity (Objective 2.C) if breeding attempts in natural or artificial burrows are observed (such as copulation, digging a burrow, entering the burrow with nesting material, sitting in the burrow), or an egg is laid.
• Natural burrows will have “stick fences” placed at their entrances after each inspection (these are toothpicks or short sticks placed in a ‘fence’ configuration i.e. in a row). Any activity by birds will knock down the sticks, alerting technicians to the possibility that the burrow is in use and triggering further monitoring through Reconyx camera traps and / or inserting push button cameras (such as Olympus Stylus Tough TG4) into burrow to capture image of end of burrow and / or use of endoscope.
• During burrow searching, any predator presence will also be assessed (such as scat, owl pellets or carcasses).
• Any burrows found will be marked with an identification tag and burrow locations will be recorded with a handheld global position system (GPS).
• Once burrow sites are located, they will be monitored, along with artificial burrows, once a month to determine occupancy, status changes over the course of the breeding season (abandonment, death of chick etc..), signs of predation and timing of breeding attempt.

12.3.1.2 Methods for monitoring artificial burrows.

• Each artificial burrow will be checked to make sure it is in working order and repaired if necessary before the breeding season commences and the entrance and tunnel will be cleared of obstructing vegetation.
• Each artificial burrow will be checked a minimum of once a month during the breeding season between April and October to monitor for signs of seabird activity around the entrance and inside the burrow chamber. Temperature and humidity will be monitored.
• Variables measured include number of active burrows, species present, signs of predator presence, evidence of predation, and nest success.
• A subset of 20 artificial burrows will be equipped with Reconyx camera traps to document visits by prospectors and / or breeders.
• Burrows occupied by breeding pairs will be monitored by Reconyx camera traps and checked monthly by IE staff through the breeding season to estimate breeding success (egg laying, chick rearing and fledging) and any predator incursions.
12.3.1.3 Methods applicable to both artificial and natural burrows

- Document internal burrow contents with visual observations or a handheld digital camera,
- Burrows will be identified to species (if possible) and classified as follows:
  - Inactive
  - Prospecting birds (birds observed to be visiting a nest with no further evidence of breeding. Examples include fresh excavations in a previously inactive burrow, a single visit to a previously inactive burrow, bird(s) found in a burrow where both adults were confirmed killed in the previous year, or a seabird present at a preliminary burrow excavation
- Burrows are assessed for breeding activity by monitoring for signs of activity in and around the burrow, including:
  - Presence of an egg, chick, or adult in or near the burrow
  - Signs of digging/trampling, feathers, guano, or an egg shell
  - Evidence of predation or nest failure
  - Scent
  - Ability to see back of burrow
- Nesting outcomes for active nests are recorded as “success”, “failure”, or “outcome unknown” as follows:
  - Success is indicated by a successfully fledged chick. In the absence of a Reconyx burrow-monitoring camera, this is determined by a chick confirmed in the burrow until the typical fledging time (late September to early December, peaking in October), down outside the burrow entrance indicating that the chick was exercising, and no signs of predation or predator presence.
  - An active nest is recorded as a failure if it did not fledge a chick. Evidence of failure is recorded when observed.
  - “Outcome unknown” is assigned to an active nest where breeding was confirmed but no follow-up visits were made, final visit was too early in the season, or signs were inconclusive. Very few, if any, burrows should fall into this category.
- All data collected in the field is digitized at the end of each trip with individual burrow locations, evidence of predation, and/or predator presence mapped using a GIS.

(Methods developed by KESRP)

12.3.2 Camera Monitoring

A camera trap is a remotely activated camera that is equipped with an infrared sensor. Camera trapping allows researchers to photograph birds or predators at a burrow and has been used in ecological research for decades.
At the site, camera traps will allow for ground activity to be observed on a continuous basis. Cameras will be initially placed near the speaker system where birds are most likely to land when responding to social attraction playback. They will also be used on burrows to record ingress of prospectors, breeding attempts and success of the egg, chick and fledging stage and predator interactions.

The cameras will provide data pertinent to Objective 2C – Ground activity by Covered Seabirds documented at the mitigation site by Year 4 of KSHCP implementation and Objective 2D – Breeding activity by Covered Seabirds documented at the mitigation site by Years 5-7 of KSHCP implementation, and will be ongoing throughout the lifetime of the project as the data will also be used to measure Objective 2E & F – Cumulative Upward Trend in Covered Seabird breeding documented at the mitigation site by Year 10 & 20.

The proposed models are a Reconyx Hyperfire PC900 camera trap (Figure 12.1) and a Reconyx Ultrafire XR6 (capable of also taking high definition video but using more memory and therefore requiring more frequent checks). However, if improved technology or another brand is found to be more effective or cost efficient, they will be selected instead.

![Reconyx Camera Trap](image)

Figure 12.1. Reconyx Camera Trap

12.3.2.1 Methods for Camera Monitoring

- IE staff will monitor artificial and/or natural burrows of ‘a’o (and ‘ua‘u if they also arrive at the site) at mitigation sites using Reconyx Hyperfire PC900 or similar cameras.
- After the first year (cameras will initially be used to monitor predators only), 20 of the 100 artificial burrows will be monitored by cameras. Burrows closer to the speaker system are likely to be occupied first and so cameras will be placed there initially; they will also be able to pick up ground activity in that area.
- Artificial burrows or natural burrows (these will be mapped as they are found, either through burrow searching or auditory surveys) will be surveyed monthly during the
breeding season and toothpicks placed in the entrance. Any that show signs of use (toothpicks falling, scent, guano etc.) will have a camera placed on them (moved from an inactive site).

- Cameras may be strategically placed in other areas within the fence enclosure to document ground activity not associated with specific burrows.
- Camera Monitoring will occur throughout the pre-breeding season, starting when the sub-adult prospectors and adults arrive (01 Apr). (Note that while most birds return in early Apr, cameras should be operational from mid-Mar to ensure that early birds are not missed)
- Variables measured include number of visitations (ground activity), number of burrows with breeding activity, number of active burrows with a chick that fledges, predator visitation rates and predation events.
- Cameras will be mounted on stakes 1-3m from the burrow entrance to record species, seabird activity and nesting outcome. Cameras will be triggered by movement and are set on a rapid-fire setting.
- All secure digital (SD) memory cards will be changed monthly, batteries changed as needed and all camera locations will be recorded using a handheld GPS unit. SD cards are to be viewed in the field to briefly assess activity levels and presence/absence of seabird predators at burrows. They will be reviewed fully in the office.
- Cameras will be checked monthly.
- All data collected in the field (i.e. on the number of images on the camera, date of SD card and battery switch out etc.) is digitized at the time on the iPad. Data will be downloaded to the server in the office. Camera viewing will take place in the office at the end of each trip and will be digitized.

12.3.3 Bird Banding

Banding is an important part of the SAS project and an established best practice monitoring technique for seabird colonies, providing data on sub-adult and adult survival rates, nest site fidelity, age at first breeding, ratio of birds recruited via social attraction versus natal philopatry and breeding probability. Morphometric measurements allow for inter-annual comparisons and could be used to indicate the general health of seabirds breeding at the mitigation site from one year to the next. This data will also contribute to the body of knowledge on ‘a‘o (and ‘ua‘u if found at the site) throughout the Island and the State.

This social attraction site was chosen because of the lack of artificial light in vicinity. It is thought that birds from this colony will not be subject to light attraction when fledging due to the orientation of the site, the dark conditions on the obvious flyway out to the ocean and a lack of visible artificial lights from the site. However, banding birds on site means that any birds that are downed by artificial lights can be identified back to the project site and mitigation measures taken to reduce any light attraction.

12.3.3.1 Methods for Banding Chicks and Adults
• Biologists conducting banding of seabirds will be required to be covered under Bird Banding Lab banding permits and be authorized by the DLNR to band or otherwise handle seabirds on Kaua‘i.
• Chicks will not receive bands until approximately 4 to 2 weeks from fledging, which occurs late September to early December, peaking in October.
• Banding will take place during burrow checks and opportunistically, if birds are found on site.
• IE staff will carry banding kits at all times during colony site visits in the breeding season and will ensure all caught birds are banded (both adults and chicks).
• A list of bird banding equipment needed to safely band and measure ‘a’o and ‘ua’u includes:
  o Appropriate shearwater-sized banding pliers;
  o Spreader pliers;
  o Pesola 1000 g scale;
  o 15 clean bird weighing bags;
  o Wing chord ruler;
  o Banding leg gauge;
  o USGS issued bird bands size #4 (50) for ‘a’o and 3A (50) for ‘ua’u;
  o 15 clean bird handling towels;
  o Pens and pencils
  o Banding logbook or notebook and iPad with custom built banding app (KESRP).
  o Umbrella or tarpaulin in case of rain during banding
  o Antibacterial handwash

Variables measured include individual identification number (USGS band number), species, weight, tarsus length, culmen length, wing length.

12.3.4 Auditory and Visual Surveys

Auditory surveys are an important part of the strategy for biological monitoring. ‘A’o are nocturnal and tend to vocalize within their colonies (and occasionally in transit); therefore, activity and location of these species may be effectively monitored at a distance of up to 1km using an auditory point count survey technique to establish and document ground activity and / or flyovers at the site. ‘Akē’akē and ‘ua’u are also nocturnal - they may be breeding or transiting within the 1km radius and therefore will be included in the monitoring although they are not expected to breed at the site.

These surveys will measure criteria for Objective 2C. Ground activity by Covered Seabirds documented at the mitigation site by Year 4 of KSHCP program implementation, Objective 2D – Breeding activity by Covered Seabirds documented at the mitigation site by Years 5-7 of KSHCP program implementation. After Year 7, however, Acoustic Song Meters will be a more efficient and accurate way to measure Objective 2 E & F – Cumulative upward trend in Covered Seabird breeding documented at the mitigation site by Year 10 & 20 of KSHCP implementation, so
Auditory Surveys will be reviewed at year 7 and phased out if the success of the project merits it.

12.3.4.1 Methods for Auditory & Visual Surveys

- Auditory surveys will be carried out by trained observers using night vision goggles. The observer auditory range is an estimated radius of 1 km. There will be 4 permanent survey locations.
- A standardized survey protocol and data sheet or iPad page (Appendix 1) will be used to allow for inter-site and inter-annual comparison and to make data compatible with KESRP surveys.
- Auditory surveys will take place twice a night (PM and AM) for 4 nights a month (1 night at each location). 2 surveyors will cover 2 locations a night for 2 nights.
- Ideally, there will be two observers for the surveys so surveys will take place AM and PM for location 1 and 2 for two nights and then likewise for 3+4 for two nights.
- Surveys will take place during the peak of the breeding season (Jun-Aug; vocalizations dramatically reduce after mid Sep).
- Surveys during full moon (and one week before and after) will be avoided as birds vocalize less during full moon periods.
- Observers will survey during the peak evening and pre-dawn activity period to account for the key calling periods of the Covered Seabirds. Although ‘a’o are the primary focus, ‘ua’u and ‘akē’akē will also be recorded.) ‘A’o are more vocal in the morning; ‘ua’u and ‘akē’akē are mainly vocal in the evening, while.
  - Evening surveys start at sunset and last for 2 hours: 4 x 30 min sessions, with 25 minutes to record seabird calls, and any visual seabird observations (using either naked-eye, binocular or night vision goggles) and 5 minutes allotted for weather data collection.
  - Morning surveys start 2 hours prior to sunrise and last 1.5 hours: 3 x 30 min sessions, otherwise methodologically the same.
- Variables measured include number of calls and sightings for each species, breeding activity seen (flight paths, circling, ground calling etc.) distance and direction of each observation from the survey point, weather conditions during survey and habitat characteristics of the survey site. Particular attention will be paid to ground activity, with individual ground calling locations noted on a map.
- Auditory surveys will be used in tandem with static song meters (after year 4) as a method of ground-truthing the song meter data with the intent of locating and mapping calling hotspots, ground activity, and flight corridors for ‘a’o (and ‘ua’u and ‘akē’akē if heard) unless song meters are found to be incompatible with the social attraction element.
- Survey locations are recorded in UTMs.
- At the end of the season the data from the field maps is entered into GIS digitized mapping to create individual breeding activity polygons for ‘a’o and ‘ua’u.
A standardized field datasheet can be found in Appendix 1 – a digital version will incorporate the same information.

12.3.5 Acoustic Bird Call Monitoring (Song Meters)

An acoustic recording device is a sound recording unit that is weather-proof, self-contained and can be used to remotely collect data in the field (Figure 12.2). The proposed models are SM4 Song Meters, made by Wildlife Acoustics.

Acoustic bird call monitoring uses song meters to create a database of calls over time, without observer bias, that can be useful in developing breeding density estimates. This technique is a powerful monitoring tool and is widely used by managers at monitored seabird colonies on Kaua‘i. It will be used to provide a baseline of activity at the colony which can be accurately measured to show population changes over the thirty years of the project (Oppel 2014). Calls/hr are relatable to the number of burrows in an area, so if call rates increase over time, one can confidently assume that seabird activity at the site is increasing.

![Figure 12.2: SM4 Song Meter](image)

Auditory and visual surveys by human observers as well as onsite burrow searching and monitoring will remain important complementary parts of the monitoring strategy to confirm birds on the ground and indications of breeding until year 7. However, not all burrows will be found by observers – song meter data gives a monitoring output for the site as a whole to offset this problem.

The song meters can record seabird vocalizations at a distance of well over 250m. Outputs from the analysis will include call rate per minute, total number of calls and activity by time.

Song meters will provide data pertinent to Objective 2C - Ground activity by Covered Seabirds documented at the mitigation site by Year 4 of KSHCP implementation and Objective 2D – Breeding activity by Covered Seabirds documented at the mitigation site by Years 5-7 of KSHCP program implementation. They will be critical in terms of measuring Objective 2E & F – Cumulative Upward Trend in Covered Seabird breeding documented at the mitigation site by Year 10 & 20.

Song Meter use will only commence in year 4 as they are incompatible with full time social attraction playback, which is most critical in the first few years of the SAS.
In 2016, as part of an assessment of a potential social attraction site on the edge of the Kalalau Valley, KESRP deployed a song meter at a central location within the site to assess whether there was any seabird activity within the site. Both ‘a’o and ‘ua’u were recorded at the Social Attraction Site (Raine et al 2016). ‘A’o were recorded almost nightly (suggesting regular activity of this species in the area), while ‘ua’u were recorded on 6 occasions. The results will be used as a baseline at the site.

For the ‘a’o, call rates were low at the survey site compared to large monitored colonies of this species on Kaua‘i (such as Upper Limahuli Preserve). However, the fact that they were recorded almost nightly during the survey suggests the possibility that a very small number of pairs may be breeding within or near the site itself. Further surveys will be carried out in 2017 and 2018 to look for burrows. Furthermore, individual birds are flying around the area vocalizing on most nights, and could therefore be drawn in by social attraction. Based on years of surveys by KESRP, the wider area (Kalalau Valley and Nā Pali coast) has large breeding populations of both species which will act as source colonies (Raine et al. 2016).

The results of this survey will represent a useful baseline for the site. The same surveys will be repeated annually until the Seabird Preserve is constructed.

### 12.3.5.1 Methods for Song Meter Deployment

- A Song Meter IV sensor ([http://www.wildlifeacoustics.com](http://www.wildlifeacoustics.com)) or similar model will be deployed within the social attraction site in the same location used by KESRP in preceding years.
- Deployment will commence in Year 4.
- The song meter will be powered by 4 D-cell alkaline batteries and store recordings on a 32GB SD memory card. Sensors will record on two channels at a sampling rate of 22 kHz. The sensor will be mounted 0.3m off the ground on a length of PVC pipe with the omni-directional microphones oriented horizontally. The location will be selected such that the sensor microphones are sheltered from prevailing winds, well away from moving branches and leaves. Microphones will be weather-proofed with scotch guard and sheltered from above with a length of PVC pipe cut in half. Other compatible technology may be used to compare previously gathered data as appropriate.
- 2016 & subsequent years prior to the fence construction will provide a baseline of seabird acoustic activity at or around the site and will be supported by observer data from the auditory and visual surveys to pinpoint the location of the calls.
- To allow for comparison with KESRP data, sensors will be programmed to record 1 minute every 5 minutes for 3 hours after sunset, and 1 minute every 10 minutes for three hours before sunrise. Programming will be undertaken using the SMCONFIG software package.
• Year 1-3: Song meter recording requires social attraction vocalization speakers to be turned off. Therefore, no song meter data will be collected in Years 1-3 of the Program, because the key objective during those years is to attract seabirds through social attraction to fulfil objective 2C in response to mitigation requirements for the KSHCP.

• Year 4 onwards: Song meter will be deployed annually for 2 months (June-July) to monitor long term changes of the seabird populations within or around the site.

• To record calling activity in the absence of social attraction playback, during the above recording schedule, loudspeakers will be temporarily disabled every third night to allow for song meter recording. Electronic timers will be used to achieve this and two nights of testing will be carried out to ensure this works, along with periodic checks by project staff.

• All song meter audio data will be sent off to an appropriate organization for automated analysis (currently Conservation Metrics Inc., Santa Cruz, California).

• Song meter will be checked (cards and battery changed) once a month.

• Seabird response monitoring frequency is shown in Table 12.5.

12.3.6 Summary of Seabird Response Monitoring

Table 12.5 outlines the monitoring frequency required to establish seabird response to management.

<table>
<thead>
<tr>
<th>Biological Objectives</th>
<th>Monitoring Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.C. Ground activity by Covered Seabirds documented at the mitigation site by Year 4 of KSHCP program implementation.</td>
<td>- Cameras installed by end Mar and checked monthly 01 Apr to 15 Dec</td>
</tr>
<tr>
<td>2.D. Breeding activity by Covered Seabirds documented at the mitigation site by Years 5-7 of KSHCP program implementation.</td>
<td>- Auditory surveys with night vision: 2 surveys 4 nights monthly (Jun to Aug) (to year 7)</td>
</tr>
<tr>
<td>2.E&amp;F. Cumulative upward trend in Covered Seabird breeding documented at the mitigation site by Year 10 and 20 of KSHCP program implementation.</td>
<td>- Burrow monitoring monthly 15 Apr -15 Dec</td>
</tr>
<tr>
<td></td>
<td>- Chicks banded 2-4 weeks before fledging; adults banded whenever encountered.</td>
</tr>
<tr>
<td></td>
<td>- Song meters from year 4 (May to Jul / Aug)</td>
</tr>
</tbody>
</table>

12.4 Annual Reports
An annual report will be delivered to the agencies by 15th April. It will include a detailed section on the project monitoring and results. This will enable USFWS and DLNR to evaluate:

1) compliance with terms and conditions of ITP/ITLs issued under the Program;
2) effectiveness of KSHCP conservation measures;
3) that continuing to authorize the permitted Covered Activities will not appreciably reduce the likelihood of survival or recovery of the Covered Species in the wild;
4) that the implementation of the Program results in a net benefit to the Covered Species as required under State of Hawai’i law.

Reports will specifically outline project progress and/or achievement of the Biological Objectives 2A-H.

13. TIMELINES FOR ALL ACTIONS AT KAHUAMA’A SEABIRD PRESERVE

Table 13.1 below provides an outline of the pre-construction, construction and initial set up maintenance actions required in the management plan for year one of conservation work at the Kahuama’a Seabird Preserve. The estimated time noted in the table is based on extensive discussions with local experts about their fieldwork. For example, in the case of setting Goodnature traps (or similar), the time taken per trap is multiplied by the total number of traps plus some time allotted for walking between traps. (This table does not include standard fieldwork operations, which are shown in Table 13.2).

Table 13.1: Fieldwork Actions and Estimated Staff Resources Pre & During Construction

<table>
<thead>
<tr>
<th>Obj</th>
<th>Actions (Pre &amp; During Construction) (additional actions to standard fieldwork during operation)</th>
<th>Frequency in 3 month construction period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Construction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All</td>
<td>Staff training</td>
<td>1</td>
</tr>
<tr>
<td>2A</td>
<td>12 return trips to the site (overnight stays at DOFAW cabin or camping)</td>
<td>12</td>
</tr>
<tr>
<td>2A</td>
<td>Site meeting contractor</td>
<td>4+</td>
</tr>
<tr>
<td>2A</td>
<td>Search entire fenceline &amp; surroundings for seabird burrows</td>
<td>2</td>
</tr>
<tr>
<td>2A</td>
<td>Forest bird &amp; pueo survey - baseline &amp; pre-construction &amp; office write up</td>
<td>2</td>
</tr>
<tr>
<td>2A</td>
<td>Assist with pre-construction baseline veg monitoring</td>
<td>1</td>
</tr>
<tr>
<td>2G</td>
<td>Flag rare plants</td>
<td>1</td>
</tr>
<tr>
<td>2A</td>
<td>Assist contractor in removing vegetation along fenceline. Botanist and archaeologist present</td>
<td>1</td>
</tr>
<tr>
<td>2A</td>
<td>1 staff present during equipment fly in and entire fence construction to oversee all BMPs</td>
<td>1</td>
</tr>
<tr>
<td>2A</td>
<td>Training from contractor on fence maintenance</td>
<td>1</td>
</tr>
</tbody>
</table>
### Risk analysis for fence post construction
- **2A**
  - Order and put up public signage on what to do if public sees a breach
  - Report to confirm fence complete / report to confirm SAS work complete
- **2A, C,D**
  - Install speaker system, test
- **2C-F**
  - Install artificial burrows
- **All**
  - Project management - 17 hours per week

### Rodent Trapping Post Construction Actions

| 2B | Rodent trapping - Set up **snap trap grid**: 50 inside fence and 40 in 50m zone outside fence. | 1 |
| 2B | Rodent trapping - Check snap traps (75) removal of carcass, bait and reset - inside & outside fence. Every 2 days for 3 months | 45 |
| 2B | Rodent trapping - Set up **bait stations grid** (50) - inside fence | 1 |
| 2B | Rodent trapping - Check and rebait bait stations: 50 inside fence twice a week for one month. Frequency can reduce to weekly after one month if appropriate, then twice a month for three months, then once a month thereafter if stations are still required | 12 |
| 2B | Rodent trapping - Set up **Goodnature grid** (25) - inside fence, and 20 outside the fence in 50m predator defense zone. | 1 |
| 2B | Rodent trapping - Check **Goodnature grid** (25) - inside fence, and 16 outside the fence in 50m predator defense zone. Check and zero counter, check CO₂, rebait monthly | 3 |
| 2B | Rodent trapping - Set up **camera traps** (20) inside fence and outside fenceline (4) | 1 |
| 2B | Rodent trapping - Check **camera traps** (24) check - 2 x month | 6 |
| 2B | Set up live **feral cat traps** (8 outside fence - only outside ones will remain after initial eradication). 2 conibears will also be placed inside the enclosure for the initial eradication. | 1 |
| 2B | Set up and monitor **ink card tracking tunnel** (25) 2 x a month | 6 |
| 2C-F | Move 20 camera traps from rodent detection to burrow detection | 1 |
| All | Project management - 20 hours per week | weekly |
### Table 13.2: Ongoing conservation actions during operation and effectiveness monitoring.

<table>
<thead>
<tr>
<th>Bio Obj</th>
<th>Action</th>
<th>No. per month</th>
<th>Season</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fieldwork</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2A</td>
<td>Fence checks (additional checks will happen as part of rodent control outside fence)</td>
<td>1</td>
<td>all</td>
</tr>
<tr>
<td>2A</td>
<td>Fence maintenance, crisis response</td>
<td>1</td>
<td>all</td>
</tr>
<tr>
<td>All</td>
<td>Return drive to site</td>
<td>4</td>
<td>all</td>
</tr>
<tr>
<td>2B</td>
<td>Rodent trapping - Goodnature Check: 25 inside fence, 16 outside fence in 50m zone, rebaiting, counter check, CO₂ check</td>
<td>1</td>
<td>all</td>
</tr>
<tr>
<td>2B</td>
<td>Ink card tracking tunnel (25)</td>
<td>1</td>
<td>all</td>
</tr>
<tr>
<td>2B</td>
<td>Rodent trapping - Snap trap check (25) removal of carcass, bait and reset - 50m zone outside fence</td>
<td>2</td>
<td>all</td>
</tr>
<tr>
<td>2H</td>
<td>Feral cat trapping – fenceline (8) - opening &amp; closing traps</td>
<td>2</td>
<td>all</td>
</tr>
<tr>
<td>2H</td>
<td>Feral cat trapping – fenceline (8) - checking &amp; rebaiting</td>
<td>8</td>
<td>all</td>
</tr>
<tr>
<td>2H</td>
<td>Feral cat trapping – fenceline - camera trap (4) check (change cards and batteries) - occur at same time as cat trap checks</td>
<td>1</td>
<td>all</td>
</tr>
<tr>
<td>2H</td>
<td>Barn owl reduction - trapping (6)</td>
<td>4</td>
<td>all</td>
</tr>
<tr>
<td>2H</td>
<td>Barn owl reduction - shooting</td>
<td>4</td>
<td>all</td>
</tr>
<tr>
<td>2H</td>
<td>Feral cat control Kalalau valley - opening &amp; closing traps, 30 live feral traps, 24 conibears, 20 legholds</td>
<td>2</td>
<td>all</td>
</tr>
<tr>
<td>2H</td>
<td>Feral cat control Kalalau valley 30 live feral traps, 24 conibears, 20 legholds - checking once open &amp; rebaiting</td>
<td>8</td>
<td>all</td>
</tr>
<tr>
<td>2H</td>
<td>Feral cat control Kalalau valley - camera trap (20) check (change cards and batteries)</td>
<td>1</td>
<td>all</td>
</tr>
<tr>
<td>2G</td>
<td>Vegetation monitoring (veg plots), seabird habitat modifier removal, outplanting of native species if required</td>
<td>1/year</td>
<td>outside seabird season</td>
</tr>
<tr>
<td>2G, 2B</td>
<td>Maintain low vegetation in predator defense zone</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>2C-F</td>
<td>Seabird monitoring - auditory surveys with night vision 2 x a night (am and pm), 4 locations, 4 nights</td>
<td>4/month x twice a day</td>
<td>inside breeding season only, Jun-Aug</td>
</tr>
<tr>
<td>2C-F</td>
<td>Seabird monitoring - camera traps (20) cards and battery changed</td>
<td>1</td>
<td>inside breeding season only, 15 Mar – 15 Dec</td>
</tr>
<tr>
<td>Task</td>
<td>Description</td>
<td>Frequency</td>
<td></td>
</tr>
<tr>
<td>------</td>
<td>-------------</td>
<td>-----------</td>
<td></td>
</tr>
<tr>
<td>2C-F</td>
<td>Seabird monitoring - song meter (1) cards and battery changed.</td>
<td>Jun 01 –Nov 30 only</td>
<td></td>
</tr>
<tr>
<td>2C-F</td>
<td>Seabird monitoring - burrow searching (incubation to fledging)</td>
<td>Jun - Nov</td>
<td></td>
</tr>
<tr>
<td>2C-F</td>
<td>Seabird monitoring - burrow monitoring (100 artificial, tba natural), annual cleaning</td>
<td>Mar - Dec</td>
<td></td>
</tr>
<tr>
<td>2C-F</td>
<td>Seabird monitoring - chick banding (during burrow monitoring, 2-4 weeks before fledging only; also adhoc banding of any adults encountered.)</td>
<td>Oct - Dec</td>
<td></td>
</tr>
<tr>
<td>2A,C, D</td>
<td>Check speaker system &amp; song meter alternation system</td>
<td>Mar - Dec</td>
<td></td>
</tr>
<tr>
<td>Office</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2B</td>
<td>Rodent trapping - Log results from Goodnature (transf. from iPad) / analysis</td>
<td>all</td>
<td></td>
</tr>
<tr>
<td>2B-F</td>
<td>Camera traps - watch cameras (20) and log data (30 mins per camera) / analysis</td>
<td>all</td>
<td></td>
</tr>
<tr>
<td>2B</td>
<td>Ink card tracking tunnel (25)</td>
<td>all</td>
<td></td>
</tr>
<tr>
<td>2H</td>
<td>Feral cat trapping - log results (transf. from iPad) / analysis</td>
<td>all</td>
<td></td>
</tr>
<tr>
<td>2H</td>
<td>Feral cat trapping – Reconyx camera trap - watch cameras and log data (20 mins per camera) / analysis (included with rodent work)</td>
<td>all</td>
<td></td>
</tr>
<tr>
<td>2H</td>
<td>Barn owl reduction - trapping (6) - log results (transf. from iPad) / analysis</td>
<td>all</td>
<td></td>
</tr>
<tr>
<td>2H</td>
<td>Barn owl reduction - shooting - log results (transf. from iPad) / analysis</td>
<td>all</td>
<td></td>
</tr>
<tr>
<td>2G</td>
<td>Invasive plant monitoring and removal - log results / analysis</td>
<td>outside breeding season</td>
<td></td>
</tr>
<tr>
<td>2G</td>
<td>Vegetation monitoring - veg plots and transect - log results (transf. from iPad) and analysis</td>
<td>outside breeding season</td>
<td></td>
</tr>
<tr>
<td>2C-F</td>
<td>Seabird monitoring - auditory surveys. Log data (transf. from iPad) and analysis</td>
<td>during breeding season only</td>
<td></td>
</tr>
<tr>
<td>2C-F</td>
<td>Seabird monitoring - song meter (1) cards to CM, review results</td>
<td>Jun 01 –Nov 30 only</td>
<td></td>
</tr>
<tr>
<td>2C-F</td>
<td>Seabird Monitoring - burrow searching. Log results (transf. from iPad) and analysis</td>
<td>Jun-Nov</td>
<td></td>
</tr>
</tbody>
</table>
14. MAXIMIZE PROJECT EFFICIENCY

In order to ensure that the deliverables are met to provide mitigation for incidental take as outlined in the KSHCP, it is important that the Kahuama’a Seabird Preserve is run efficiently. Staffing is a key part of that. Final decisions on the staffing or contractual consultant required to complete all Management Plan tasks will be decided by the IE, but a possible outline is provided below.

Staff will be recruited in the first quarter of the first year and will be appropriately trained and equipped. Both staff members will be trained as a conservation firearm specialist (training provided).

14.1 Staffing - Program Manager

The Program Manager is the lead staff member implementing the KSHCP on behalf of the Participants. This is likely to be a part-time position. The responsibilities for this position include implementing the Management Plan for the Kahuama’a Seabird Preserve but also encompass other KSHCP duties. The incumbent will have expertise in conservation biology as well as proven project management experience. Position will be both field and office based.

Duties will include overall project management, budget management, hiring IE staff members, personnel supervision compiling data and writing annual reports on project progress, ensuring that mitigation goals are achieved, implementing adaptive management if required, coordinating with SOS (or other qualified veterinarian) as needed, presenting at ESRC and other professional conferences, serving as a liaison between the mitigation project, regulatory
agencies and participants. Field duties include working with fence contractor, supervising technicians and overseeing / carrying out monitoring fieldwork and predator removal efforts.

14.2 Staffing - Technician

The Technician is a field position posted primarily at the Kahuama’a Seabird Preserve. The Technician will have experience in conservation, field work, monitoring and reporting. Primary duties will also include effectiveness monitoring for mitigation work, monitoring breeding of covered species on site, long term biosecurity at the mitigation site, feral cat and barn owl predator control and non-native plant removal.

14.3 Staff Training

Staff will receive training as follows:

- Wilderness First Aid
- Firearms
- Vegetation monitoring
- Seabird monitoring, management and predator control

14.4 Equipment and Office

IE will purchase and maintain appropriate equipment. For a full list of equipment, see budget Appendix H in the KSHCP.

IE will source appropriate office space. Options include moving into an agency office.

14.5 Stakeholder and Partner Management

IE will ensure cooperation amongst stakeholders by:

- Maintaining a website
- Setting up a Facebook page for the project which will be updated quarterly, and encouraging stakeholders to follow it.
- Answering stakeholder queries as they arise.

IE will manage any conflict between stakeholders, project and other users of the area and employ stakeholder conflict resolution techniques if required.

14.6 Fulfill Reporting Obligations

IE will initiate regular reporting schedule to participants and regulatory agencies, including financial reporting.

14.7 Fulfil Accounting Obligations

IE will keep a full accounting record of the project.
14.8 Review and Revise Management Plan Every 5 Years

IE will review and revise (as needed) the management plan every 5 years, in conjunction with the agencies.

15. BUDGET SUMMARY

The budget is a key section of the Management Plan, outlining project expenditure and income for every category and action. However, the budget for the Kahuama’a Seabird Preserve is also important for the KSHCP as income is dependent upon Applicant take. For that reason, itemized estimates have been included as an appendix to the KSHCP (Appendix G). An introduction and explanation of Management Plan costed items can be found there.

16. ADAPTIVE MANAGEMENT SOLUTIONS

The adaptive management process for the KSHCP is outlined in Section 6.9 of that document. The biological objectives of the KSHCP set triggers for initiating adaptive management by specifying actions that must be accomplished by target years. If these targets are not met, the actions described this Management Plan may be altered to better achieve program outcomes.

While it is not possible to consider every alternative, Table 16.1 lists potential adaptive management solutions, though other solutions may be more appropriate at the time of implementing adaptive management. Across all actions, if alternate technology becomes available that is within stated budget and will achieve objectives more efficiently or cost effectively, this may be employed. Costs associated with potential solutions below are presented in Appendix H of the KSHCP.

Table 16.1. Adaptive Management Scenarios

<table>
<thead>
<tr>
<th>KSHCP Objectives</th>
<th>Scenario requiring adaptive management</th>
<th>Potential Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.A. Construct a predator-proof fence and install social attraction equipment (nest boxes, speakers) within the fenced area at the mitigation site in Year 1 of KSHCP implementation.</td>
<td>Fence construction. delayed by unforeseen event</td>
<td>Additional funds to contractor - 15% more labor @ low cost</td>
</tr>
<tr>
<td></td>
<td>Fence design not adequate to exclude predators &amp; repairs needed</td>
<td>Additional materials &amp; labor needed to rebuild fence</td>
</tr>
<tr>
<td></td>
<td>Additional rare plants found, work delayed</td>
<td>Additional funds to contractor - 15% more labor</td>
</tr>
<tr>
<td></td>
<td>Archaeological remains found, work delayed</td>
<td>Additional funds to contractor - 15% more labor</td>
</tr>
<tr>
<td>---</td>
<td>------------------------------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>No suitably qualified fence contractor available in US to build fence in year one</td>
<td>Fly team from NZ or elsewhere</td>
</tr>
<tr>
<td>2.B. Remove predators from within the fenced enclosure with monitoring confirmation of their absence, and activation of the social attraction equipment by Year 2; predator eradication within fenced enclosure maintained for the life of the project</td>
<td>Predator removal unsuccessful at 1st attempt</td>
<td>Double trapping efforts inside fence - equipment</td>
</tr>
<tr>
<td></td>
<td>Fence breach from tree fall, predators enter</td>
<td>Repair fence</td>
</tr>
<tr>
<td></td>
<td>Fence breach from tree fall, predators enter</td>
<td>Repair fence</td>
</tr>
<tr>
<td>2.C. Ground activity by Covered Seabirds documented at the mitigation site by Year 4 of KSHCP implementation.</td>
<td>Monitoring insufficient</td>
<td>Increase camera trap effort by 20%</td>
</tr>
<tr>
<td></td>
<td>Birds not attracted to site</td>
<td>Double speaker system &amp; change soundtrack</td>
</tr>
<tr>
<td></td>
<td>Birds not attracted to site</td>
<td>Fly in and/ or consult with expert from NZ</td>
</tr>
<tr>
<td></td>
<td>Birds not attracted to site</td>
<td>Install decoys</td>
</tr>
<tr>
<td>2.D. Breeding activity by Covered Seabirds documented at the mitigation site by Years 5-7 of KSHCP implementation.</td>
<td>Monitoring insufficient</td>
<td>Increase camera trap effort by 20%</td>
</tr>
<tr>
<td></td>
<td>Birds not breeding at site</td>
<td>Add new artificial burrows within fence</td>
</tr>
<tr>
<td></td>
<td>Birds not breeding at site</td>
<td>Fly in and/ or consult with expert from NZ</td>
</tr>
<tr>
<td></td>
<td>Birds not breeding at site</td>
<td>Survey for additional invasive plants that may be modifying habitat to make it unsuitable</td>
</tr>
<tr>
<td></td>
<td>Birds not breeding at site</td>
<td>Replace all artificial burrows</td>
</tr>
</tbody>
</table>
2.F. Continued cumulative upward trend in Covered Seabird breeding documented at the mitigation site by Year 20 of KSHCP program implementation. & see 2D & 

<table>
<thead>
<tr>
<th>2.G. Maintain high quality seabird habitat at the mitigation site by removal of habitat modifying invasive plants in Year 1 and annually throughout the 30-year duration of the KSHCP.</th>
<th>Initial pass at habitat modifier removal fails</th>
<th>Repeat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Additional invasive plant found</td>
<td>Removal effort</td>
<td></td>
</tr>
<tr>
<td>Habitat modifiers persist despite technician maintenance work</td>
<td>Repeat removal pass</td>
<td></td>
</tr>
<tr>
<td>Removal work is more expensive than predicted due to e.g. presence of additional rare plants</td>
<td>Additional funds</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2.H Protect nesting birds inside mitigation fence and in nearby source colonies by implementing predator control of 1) barn owls within the area surrounding the fenced enclosure and the Kalalau Valley, and 2) feral cats at ingress points to source colonies in the Kalalau Valley, beginning in year 1 and annually throughout the 30-year duration of the KSHCP.</th>
<th>No barn owls removed</th>
<th>Additional shooting nights</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Alternative trapping/luring techniques</td>
</tr>
<tr>
<td></td>
<td>Barn owls kills still occurring in preserve</td>
<td>Additional shooting nights / new techniques</td>
</tr>
</tbody>
</table>

17. **BEST MANAGEMENT PRACTICES**

To avoid any adverse effects to species and habitats of conservation concern, Best Management Practices will be employed at all times at the project site for the following species and specific concerns:
Kahuama’a Seabird Preserve Management Plan

- **Covered Species** – ‘A’o, ‘ua’u and ‘akē’akē. The benefits to these species of the Kahuama’a Seabird Preserve have been outlined above. See individual BMPs on each activity for further details on how harm will be completely avoided.

- **ʻOpeʻapeʻa**: This is a listed species (Federal and State). It could be present at the Kahuama’a Seabird Preserve. Overall, the creation of the Preserve will provide a potential benefit to the ʻōpeʻapeʻa through conservation of the native habitat and control of non-native predators. The amount of disturbance that will occur while conducting conservation measures is minimal, temporary, and of limited duration. See individual BMPs on each activity for further details on how harm will be completely avoided.

- **Forest Birds**: Several candidate and listed native forest birds and pueo may use the Preserve as territories and / during the breeding season Jan to Jun (see section 3.1.4). Overall, the creation of the Preserve will provide a potential benefit to forest birds and pueo through removal of non-native habitat and control of non-native predators - both are identified as primary threats to native forest bird species in Hawai‘i (VanderWerf 2012). The amount of disturbance that will occur while conducting conservation measures is minimal, temporary, and of limited duration. See individual BMPs on each activity for further details on how harm will be completely avoided. It should be noted that KESRP located a pueo nest that had been predated by cats in Pihea in 2015, indicating that cat control will be beneficial to this species.

- **Listed or Rare Plants and native plant habitat**: Several listed or rare species of plant have been observed in the project area. Overall, conservation activities in the Kahuama’a Seabird Preserve are anticipated to result in dramatically improved habitat and reduced habitat modification that could otherwise occur from the negative effects of non-native animals and plants (see Section 12 - Vegetation Restoration - for a fuller explanation). The preserve’s proximity to the road, and proximity to lookouts frequented by high numbers of tourists, presence of feral animals such as pigs and rats and current habitat degradation means that the area is already exposed to the risk of invasive species. Specifically, botanists have reported that the fence will be of direct conservation benefit to one individual of *Myrsine knudsenii* (E, PEP), four individuals of *Exocarpos luteolus* (E), one *Lobelia yuccoides* (SOC), one *Polyscias flynnii*, and a large occurrence (unknown number of individuals) of *Euphorbia remyi var. remyi* (E) (A. Williams, Pers. Comm.) Plant monitoring will not be limited to endangered species; changes to more common plant species that form the bulk of the native habitat will also be monitored. See individual BMPs on each activity for further details on how harm will be completely avoided.

- **Soil Erosion**: In the longer term, with re-vegetation and removal of ungulates, soil stability is expected to improve. Improved soil stability is expected to reduce erosion in the mitigation area which will reduce surface water runoff and water turbidity. In the short term, however, erosion might compromise the exclusion of predators from the fence as well as affecting Listed and Rare Plant species. See individual BMPs on each activity for further details on how harm will be completely avoided.
• **Rapid ‘Ōhi’a Death (ROD),** a fungal disease, is currently attacking and killing ‘ōhi’a (*Metrosideros polymorpha*), the most abundant native tree in the state of Hawai’i. On Hawai’i Island, hundreds of thousands of ‘ōhi’a have already died across thousands of acres from this fungus, called *Ceratocystis fimbriata*. It is currently not in Kaua’i but its arrival would devastate the native forest. See individual BMPs on each activity for further details on how harm will be completely avoided.

• **Cultural Resources:** There is currently no evidence of archaeological remains at the Kahuama’a Seabird Preserve as noted in section 7.2. In 1997, prior to the construction of the nearby Kalalau Rim Endangered Plant Exclosure, State Park archaeologists conducted a reconnaissance survey in the area of the Kahuama’a Flat and did not encounter archaeological sites or features. Nonetheless, archaeologist guidelines will be followed as specified in the BMPs for individual actions. See individual BMPs on each activity for further details on how harm will be completely avoided.

KSHCP conservation program activities in the Management Plan for the Kahuama’a Seabird Preserve will not result in take under section 10(a)(1)(B). The DLNR (IE) will operate under the existing Section 6 Agreement when implementing the Management Plan. If the work will be performed by another entity other than DLNR, then it will be conducted by an individual holding a research/enhancement take permit pursuant to section 10(a)(1)(A) and a State permit.

To ensure that BMPS are followed during construction, a suitably fence qualified contractor will be engaged through a bids process. As part of the contract, contractor will agree orally and in writing to all BMPs. Contractor will be made aware that failure to follow BMPS may result in legal and financial penalties. Contractor and his team will receive training from IE staff on BMPS. A concrete timeline for the delivery of the fence will be established in the contract. A construction deadline will be established during contract negotiations with monetary penalties.

The following sections outline in detail how BMPS will be used to avoid causing harm to listed species and to habitats. All staff, including biologists and technicians, entering the enclosure will be trained and follow the BMPS or will not be permitted to enter the enclosure. Any visitation to the mitigation area will be limited to what is absolutely necessary to accomplish objectives of the management plan and for compliance monitoring.

### 17.1 SEABIRDS

#### 17.1.1. BMPS – Seabird Protection During Pre-construction & Construction

Pre-construction monitoring is critical to ensure that no seabird burrows are damaged during fence construction and sling-load drops. No burrows were found in 2016 or 2017 during auditory surveys, but no active burrow searching was carried out on site. Further surveys will be carried out in 2018.
If burrows were to be present, risks to covered seabirds through clearing of vegetation, increased risk of soil erosion, increased human presence, low altitude helicopter traffic and equipment drops could be:

- Damage to or destruction of burrows
- Disturbance to breeding seabirds (potentially leading to abandonment of nesting sites)

Impacts will be completely avoided using BMPs as follows:

- Work most likely to damage seabird burrows will occur during the period December to April, i.e. outside the breeding season, namely vegetation clearance, pole installation and other ground disturbing work. Fence construction may only commence during this period if it is reasonable to expect that work that could affect seabirds will be completed on the sloping sections of the fenceline (i.e. those most favourable to seabird colonization) before the seabird breeding season commences. If the project is delayed for any reason, the second phase of construction will only go ahead if it does not affect the covered species.
- However, work may continue into the breeding season to complete the fence provided it is either on the flat areas of the site or does not include ground disturbing work noted above that would damage potential burrows or birds in burrows. If construction occurs during the breeding season, 8 auditory surveys will be carried out in advance (see section 12.3.4) within 10m of the fenceline to ensure that there is no ground activity in the immediate area of the fenceline.
- The proposed fence lines and sling load drop zones will be thoroughly searched for seabird burrows by trained personnel before or during the onsite meeting. Training will be provided by KESRP or other qualified trainers. Staff will check all tree roots within 10m of the fence line. Any suitable holes within 10m of the fence line will be checked for guano, scent, feathers, eggshell, digging.
- Any burrows located will be marked on a GPS, cattle tagged and obviously flagged.
- If burrows likely to have been recently active (within last breeding season) are found along the proposed fence alignment route, the fence will be re-routed if practically possible or the fence installation will work around burrows so that they are not destroyed.
- Buffer zone between the burrow and the fence will depend on the angle of the burrow and the slope that the burrow is situated upon, but is expected to be no less than 5m and up to 20m if near a possible take-off zone. If a burrow is present in a proposed sling-load drop zone, the zone will be relocated.
- A seabird biologist will be present during all vegetation clearing by the contractor.
- After vegetation has been removed along the fence line, a further burrow search will be carried out. Vegetation removal should not be necessary on sling load drop zones.
- A pre-construction monitoring report will be completed outlining how the above conditions have been satisfied.
- As the fence is being installed, an IE staff member will be on site at all times to monitor the immediate environs to ensure that no seabird burrows are present. They will look for suitable holes and will also note the presence of seabird signs such as guano,
footprints, scent, presence of feathers, down or eggshell and nesting material that might have appeared since the pre-construction surveys. They will also check all tree roots as these are often the site of burrows.

- It is highly unlikely, given the provisions in the pre-construction section, that burrows will be located along the fence line by the IE monitor once construction commences. If this occurs, however, IE staff will consult with the regulatory agencies and the fence contractor so that impacts to the burrows are avoided.
- Sling load drop zones will most likely not be used post construction, but if required, they will be re-assessed for burrows before each post-construction use.
- All personnel (including the fence contractor) working in the mitigation sites will be trained to follow the seabird protection BMPs and given oral and written instructions. Training will be provided by the KESRP or other qualified trainers. Both project staff and fence contractors will be required to carry paper and / or GPS maps showing the locations of any known burrows and will know how to recognize burrow tagging.

**17.1.2. BMPs - Seabird Protection during Rodent Eradication (inside fence)**

The eradication of predators is likely to have a highly positive effect on breeding success once the Kahuama’a Seabird Colony is colonized. However, risks to covered seabirds could be:

- Damage to or destruction of burrows during monitoring of traps
- Disturbance to breeding birds (potentially leading to abandonment of nesting sites)
- A bird being killed or injured by a trap

Impacts will be completely avoided using BMPs as follows:

- Goodnature traps were designed to be used in seabird colonies. They are difficult for birds to trigger when placed 12cm off the ground and in addition, are not attractive to birds (Goodnature 2017). It is exceptionally unlikely that a seabird would be killed by a Goodnature and in 5 years of using this method in Kaua’i by KESRP and other projects, no seabird deaths have been recorded (A Raine, 2017, pers. comm.) Other brands can be used provided they will not affected listed species.
- Snap traps have the potential to cause harm or death to Covered or Listed Species. This will be prevented by enclosing the trap in a boxed housing that cannot be accessed by the seabirds. Boxed housings will be inspected and repaired immediately prior to a planned trapping effort.
- Stationary bait boxes are designed in such a way that they cannot be accessed by seabirds. Poison bait may be removed by rats and left outside the box, however the bait is not appealing to seabirds and therefore the risk of ingestion is considered to be zero.
- All field workers and technicians will receive training to recognize potential seabird breeding burrows, (both active and inactive) and recognize burrow markers and program them into a GPS. They will be required to have a map of burrows and / or GPS points on them at all times at project site. Any burrows will be reported to KESRP.
• Workers will route trails around burrows and place traps and bait stations at least 10m away from known breeding burrows to avoid inadvertent trampling (and predator attraction from the scent of the bait) during the course of setting and checking traps and bait stations.
• Training will emphasize the use of due caution when walking off trail to avoid the trampling of burrows, particularly in areas which look suitable for seabird breeding activity.

17.1.3. BMPs - Seabird Protection – Collision Avoidance

The curved hood of the predator-proof fence is prominent and likely improves visibility. Similar projects for petrels and shearwaters in New Zealand have not encountered any problems related to seabirds colliding with the fence (SWCA 2011). Nonetheless, risks to covered seabirds could be:

- Injury or death due to collision with conservation fencing during the hours of darkness
- Downing of adult birds resulting in an ability to take off; this could lead to starvation of parent and chick
- Impeding take-off ability of chicks, leading to starvation

Impacts will be completely avoided using BMPs during construction work as follows:

• The fence will not be erected within 20m of a known seabird burrow
• Fencing will be installed without barbed wires, or similar sharp pieces, which could snag the birds (Hodges and Nagata 2001).
• A stripe of white reflective paint will be applied to increase the visibility of the fence to incoming and outgoing seabirds (Swift 2004). Commercial bird reflectors will be hung every 20m if appropriate.

17.1.4. BMPs – Seabird Protection during Cat Control

Cats will be removed from inside the fence before social attraction commences and the trapping of cats outside the fence (in the predator defense zone) will reduce the risk of reinvasion. However, as live feral cat traps sit on the ground, the risk to covered seabirds could be:

- A bird being caught, injured or killed by a trap

Impacts will be completely avoided using BMPs as follows:

• Live trap placement will be ≥25m away from known seabird burrows
• Conibears will be placed in bird excluding boxes
• All field workers and technicians will receive training to recognize potential seabird breeding burrows, (both active and inactive) and recognize field markers. They will be required to have a map of burrows and / or GPS points on them at all times at the site. Any burrows will be reported to KESRP.
• Live Traps will be checked every 24 hours.
• In the rare and unlikely event that a seabird does become caught, the live traps are well concealed and spacious enough that a seabird will not become harmed from exposure or damage from the trap itself. If a bird is found in the trap during daylight hours, then it will be released into the nearest potential seabird burrow where it has sufficient space to hide for the rest of the day (i.e., workers will not release birds into vegetation or attempt to get a bird to fly away).

17.1.5. BMPs - Seabird Protection during Barn Owl Trapping and Shooting

The trapping / reduction of barn owls is expected to have a positive effect on breeding success in the preserve and the source colonies for the Kahuama’a Seabird Colony as this species is a known seabird predator on Kauai. However, the risk to Covered Species could be:

- Damage to or destruction of burrows during monitoring of traps
- Disturbance to breeding birds (potentially leading to abandonment of nesting sites)
- A seabird being caught, injured or killed by a trap
- A seabird being mistaken for a barn owl and shot

Impacts will be completely avoided using BMPs as follows:

• Existing paths will be utilized as much as possible to minimize local impact and barn owl trapping will be combined with other predator control activities to reduce trips.
• Barn owl control will maintain a greater than 25m distance from known nesting seabirds to avoid impacts to the birds. IE staff will be required to carry a map and / or GPS points with known burrow locations.
• There is potential that Covered Seabirds could be mistaken for barn owls and shot. This risk will be completely avoided by 1) providing appropriate training to technicians 2) using a spotlight at all times 3) requiring positive identification before shooting

17.1.6. BMPs - Seabird Protection during Monitoring Work

Risks to listed seabird species could be:

- Injury during banding
- Trampling of natural burrows during burrow searching
- Trampling of natural burrows or crushing of birds during auditory and visual surveys

Impacts to Covered Species will be completely avoided by following BMPs as follows:

Banding

• Biologists conducting banding of seabirds will be required to be covered under Bird Banding Lab banding permits and be authorized by the DLNR to band or otherwise handle seabirds on Kaua‘i.
• Chicks will not receive bands until approximately 4 to 2 weeks from fledging.
• Only individuals trained in seabird handling and banding will be allowed to touch birds, unless an emergency occurs in which a bird requires rescuing.
• The amount of time a bird is handled during banding will be kept to a minimum, typically less than 2 minutes.
• If harm to an individual seabird does occur, due to an unexpected event or an accident while conducting the conservation measures, the regulatory agencies will be notified within 24 hours or as soon as practically possible, and a report filed within 3 days. Technicians and field workers will deliver injured birds to the Save Our Shearwaters (SOS) project or other qualified veterinarian or rehab center immediately for rehabilitation and potential release.

Burrow searching

• If burrows are located along the fenceline post construction, locations will be clearly marked with flagging and an individually numbered cattle tag, and the fence-monitoring trail will be re-routed to avoid unnecessary disturbance to burrows during regular fence maintenance activities.
• Staff will be trained to look for and recognize burrows (active and inactive) as they are searching the site to ensure that they do not inadvertently trample a burrow. If this occurs, staff will excavate the burrow and ensure that any bird inside was not injured (if injury occurs, see point above). Staff will attempt to repair the burrow using any means possible to ensure that it is still usable, whether or not a bird is inside. Burrow locations will be programmed into a GPS and shared with all other project staff. Staff will be required to have a map of burrows and / or GPS points on them at all times at the site. Any burrows will be marked with a cattle tag and reported to KESRP.

Auditory and Visual Surveys

• To avoid damage to seabirds at night by trampling during auditory and visual surveys, staff will stay in one place as much as possible and when moving, will take care to avoid stepping on birds. Training will be supplied by KESRP or other qualified body.

17.1.7. BMPs – Seabird Protection during Restoration and Monitoring

Risks to listed seabird species could be:
- Trampling of or damage to natural burrows during invasive species removal and nature vegetation restoration
- Presence of herbicide residue near burrows

Impacts will be completely avoided through BMPs as follows:
• Vegetation removal and restoration activities will not occur during seabird breeding season (01 Apr to 15 Dec)
Herbicides will not be used within 3m of a known burrow.

Where shrubs and/or trees need to be removed within 10m of a known burrow, the burrow will be inspected first to see if removal might compromise the structural integrity of the burrow. If the burrow is known to have been used, it may be appropriate to simply trim the invasive plant species rather than risk damaging the burrow through removal. Where the burrow has shown no signs of recent use (guano, feathers, excavations, eggshell, scent) every care will be taken to prevent burrow damage and the shrub/tree removal will go ahead.

Existing paths will be utilized as much as possible to minimize local impact

All personnel working on invasive species removal and vegetation restoration must be trained to follow the seabird protection BMPs and given oral and written instructions. Training will be provided by KESRP or other qualified trainers.

All staff will be required to carry a map and/or GPS showing the seabird burrows located in the Kahuama’a Preserve and to take particular care not to crush them. Known burrows will also be clearly marked with a cattle tag and reported to KESRP.

17.2. BATS

17.2.1. BMPs – Bats – Pre-Construction, Construction & Operation

Risks to ʻōpeʻapeʻa from activities such as tree trimming, removal of woody plants greater than 4.6m, fence construction and invasive species removal could be:

- Inadvertently harming or by disturbing roosting sites during the roosting and pup-rearing season (June 1 through September 15).

Impacts will be completely avoided using BMPs during pre-construction work as follows:

- The proposed fence lines will be thoroughly searched for trees which would be suitable for bat roosts (4.6m or above).
- Where trees over 4.6m need to be removed for construction, a Fluke Ti400 thermal imager (or similar) will be used to scan the tree or a contractor will be hired, in conjunction with an acoustic survey using bat detectors and a visual survey to ensure that no bats with pups are present.
- If there are trees 4.6m or above in the proposed sling load drop zones they will be scanned for bats as above and only removed outside the pupping season.
- Tree trimming and invasive species removal / vegetation restoration will take place outside the roosting and pup-rearing season (June 1 through September 15). If this is not possible, a Fluke Ti400 thermal imager (or similar) will be used to scan the tree, in conjunction with an acoustic survey using bat detectors and a visual survey to ensure that no bats with pups are present. If bats or pups are found, work will stop and the regulatory agencies will be consulted.
- All personnel (including the fence contractors) in the mitigation sites must be trained to follow the bat protection BMPs and given oral and written instructions.
17.2.2. BMPs - Bat Protection during Barn Owl Control

Barn owls are known to prey on bats in other locations (Speakman 1991) so it is possible that they may be a predator of the ‘ōpe‘ape‘a. Therefore, their trapping or suppression is likely to be beneficial or neutral to bats. Since bats fly at night however, the risk to them could be:

- Accidental shooting

This risk will be completely avoided using BMPs as follows:

- providing appropriate training to technicians
- using a spotlight at all times
- requiring positive identification before shooting
- no shooting when bats are seen flying in the immediate environs (i.e. within 500m)

The activities carried out in the rodent eradication, cat trapping, and monitoring work are expected to have no potential to negatively affect the ‘ōpe‘ape‘a.

17.3. FOREST BIRDS AND PUEO

17.3.1. BMPs – Forest Birds and Pueo – Pre-Construction and Construction

Forest birds are known to be in the area, including i’iwi (Drepanis coccinea) (a candidate for federal listing under the ESA), ʻapanane (Himatione sanguinea), Kaua‘i ʻelepaio (Chasiempis sandwichensis), Kaua‘i amakihi (Hemignathus Kaua‘iensis) and ʻaniniau (Magumma parva). ʻAniniau and Kaua‘i ‘amakihi were observed singing which may be an indication of breeding in the area. The pueo, a native Hawaiian Owl, has also been sighted several times in the area. Pueo have relatively wide home ranges and as such, it is possible that the Kahuama’a Seabird Reserve is part of the range several pueo.

Risks to listed forest birds and pueo through tree trimming and fence construction, could be:

- Disturbance of breeding birds and nests
- Removal of nesting habitat and feeding habitat in the form of large trees, especially ʻōhia.

Impacts will be completely avoided using BMPs during pre-construction work as follows:

- Consultation with KFBRP will occur before the start of construction to exchange the most current information on the distribution and status of candidate and listed forest birds at the site.
- All personnel (including the fence contractors) working in the mitigation sites must be trained to follow BMPs and given oral and written instructions.
- A baseline survey will be completed to establish use of the area by forest birds during the breeding season January through June and to locate any nests. Pueo nest throughout the year, so a search for their nests would be necessary all year round.
• Pre-construction, surveys will be conducted at areas proposed for conducting conservation activities including installing fences, creating helicopter landing zones, installing social attraction equipment, trapping and baiting, and monitoring.
• Any candidate or listed forest bird species (trees) or pueo (ground nesters) nests found nesting in the vicinity of these areas must be marked via GPS and identified on maps and the information transmitted to managers, other staff and the regulatory agencies.
• Pueo nests will be given a buffer of 20m that will be marked with flags. No disturbance of these nests should occur in that buffer area and if not already occurring, predator control should be initiated. Trees with forest bird nests will be flagged. (Project staff will be required to know these locations and to recognize nest markers in the field.
• Fencing & helicopter sling-load drop zone: For listed forest birds or pueo found nesting along the proposed fence line, the trees supporting nests will be marked and/or fenced off (forest birds) and the ground area of the nest marked and / or fenced off (pueo) and the fence re-routed to avoid impacts to the forest bird species and pueo. Drop zones will be relocated if candidate or listed forest bird nests or pueo are found to be within 50m.
• Workers are required to know the location of marked and identified nests and maintain a 5-meter buffer around the nesting area for candidate or listed forest birds. Clearing and trimming activities are not to occur within this area. For pueo, a 100m buffer would be required. If that is not possible, incubation and nesting is complete within 35-55 days in total and it may be necessary to delay work that would cause disturbance until the birds have fledged.
• Every effort will be made to avoid removing large trees, especially ōhia. However, it is recognized that the benefits of the predator proof fence will outweigh any potential habitat loss for forest birds, since this would be of negligible size.
• It is unlikely, given the provisions of the pre-construction monitoring, that nests will be discovered in the vicinity of the fence line. As a precaution, when the fence is being installed, an IE staff member will be onsite at all time to monitor the immediate environs for candidate or listed forest bird or pueo nests, or breeding pairs in a territory. If nests are found, the tree will be flagged and no activity likely to disturb the nest will take place within a 100m buffer zone or until after fledging. This includes vegetation / tree removal. However, in the case that a nest is empty and birds are not actively breeding (based on expert advice, which will be sought) trees can be removed.
• Little is known about the breeding biology of pueo, but their nests, which are on the ground, have been found throughout the year (DLNR 2005). If nests are found, the nest will be flagged and no activity will take place within a 20m buffer zone. This includes vegetation and tree removal. A mini fence will be erected to ensure that someone does not accidentally step on the nest.
• All personnel (including the fence contractors) working in the mitigation sites must be trained to follow the forest bird and pueo protection BMPs and given oral and written instructions.
17.3.2. BMPs - Forest Bird Protection during Predator Control and Invasive Species Removal

The eradication of predators and vegetation restoration work is likely to have a positive effect on any forest birds that make a breeding attempt inside the Kahuama’a Seabird Colony. However, the risks from project work could be:

- Disturbance of nests.

Impacts will be completely avoided using BMPs as follows:

- KRBRP or other qualified person will provide training to project staff annually or as required on identification of forest birds by call and sight as well as nest finding.
- Any nests will be marked and IE staff will be required to carry a paper map and / or GPS with nests marked.
- Ongoing monitoring of trapping and baiting will occur year-round, encompassing the forest bird breeding season. Areas for trapping and baiting will be surveyed monthly during the breeding season to confirm the presence or absence of forest bird nests. Any nests will be clearly marked and trails used to access traps and bait stations will be re-routed if necessary to avoid disturbance to any nesting candidate or listed forest bird species. Survey results will be reported to KFBRP.
- When placing, setting, and checking traps and bait stations workers are required to know the location of any nesting candidate or listed forest birds and pueo and to maintain a 5m buffer around the nests, each of which will be marked (e.g., with flags and with GPS coordinates).
- When placing, setting, and checking traps and bait stations workers are required to know the location of any nesting candidate or listed forest birds and pueo and to maintain a 10m buffer around the nests for forest birds and 20m for pueo, each of which will be marked (e.g. with flags and GPS coordinates).
- Areas for seabird monitoring will be surveyed monthly during the breeding season to confirm the presence or absence of candidate or listed forest bird and pueo nests. Any nests will be clearly marked (buffer area will be marked in the case of the pueo) and trails used to access traps and bait stations will be re-routed if necessary to avoid disturbance to any nesting forest bird species. Survey results will be reported to KFBRP.
- If burrows need to be checked in the vicinity of a nest, extra care will be taken not to disturb the candidate or listed forest bird or pueo nest, such as keeping noise to a minimum and having only one person check the burrow quickly.
- Cameras will not be placed on burrows within 10m of forest bird nests and 100m within pueo nests as this requires extra disturbance.
- Invasive plant removal and habitat restoration will not take place within 25m of the nest.
17.3.3. BMPs - Pueo Protection during Eradication (inside fence)

Diphacinone is noted to have a ‘moderate’ risk of secondary poisoning to birds by the National Pesticide Information Centre although large amounts of the poison would need to be ingested. The risk from the predator control work to pueo could be:

- Secondary poisoning from pueo consuming rodents which have ingested poison.

The following protocol will be followed to ensure that impacts are completely avoided:

- Project staff will collect any dead rodents and dispose of them off site. Whenever stationary rodent bait traps are in use, staff will monitor the project site weekly to increase the likelihood of finding carcasses.
- Stationary bait stations will only be used inside the fence and for the minimum time possible to achieve zero rat sign on ink-card tracking tunnels and signs of bait take for three months (slightly longer than the average reproductive cycle for rats).
- Secondary poisoning to animals other than rodents as well as any occurrences of damaged or vandalized bait boxes will be reported to the U.S. Fish and Wildlife Service, DLNR and Pesticides Branch of the Hawai‘i Department of Agriculture within 24 hours of being discovered.

17.3.4. BMPs – Pueo Protection during Barn Owl Trapping and Shooting

Since pueo are similar in flight to barn owls, there risk to this species could be:

- Accidental shooting

Impacts will be completely avoided using BMPs as follows

- Providing appropriate training to technicians
- Using a spotlight at all times
- Requiring positive identification before shooting
- No shooting when pueo are seen flying in the immediate environs

17.4. PLANTS

17.4.1. BMPs - Plant Protection – Pre-construction and construction

Removal and disruption to some native plant species will be unavoidable during construction but will be kept to a minimum. It is important to note that the site was specifically selected to minimize damage to listed and rare plants.

Risks to listed or rare plant species during fence construction could be:

- Uprooting, trampling, soil erosion, crushing
- Damage to E. remyi var. remyi (E), (a vining, weakly branched plant whose stems are growing on top of and through the mats of uluhe fern).
- Damage to other PEP plants within the fenceline
- Alteration to native habitat
The only Endangered species that occurs close to the proposed fenceline that might be affected is to *E. remyi* var. *remyi* and appropriate precautions will be taken (as listed below) to ensure that damage does not occur.

Impacts will be completely avoided using BMPs during pre-construction & construction work as follows:

- Prior to fence alignment and sling load drop zone creation, staff (including the fence contractors) will receive training from a botanist (either from the regulatory agencies or a consultant) on identification of rare plants in the area and be given oral and written instructions.
- Pre-construction baseline monitoring will be carried out to identify and / or confirm all listed and rare plants and their locations (see Section 12 – Vegetation Restoration - for full details.)
- A botanist or member of IE staff trained in plant identification for the localized area will be present at all times during alignment and sling load drop zone discussions on site as well as during construction.
- Within the enclosure, unknown number of individuals of *E. remyi* var. *remyi* are growing. This is a vining, weakly branched plant whose stems are growing on top of and through the great mats of ‘uluhe fern that dominate the area and as such, is at risk of being cut or trampled during fence construction. During pre-construction surveys, the plants will be indicated by flagging and staff will be provided with a map showing the location, as well as GPS points (these flags will not be left permanently as botanists are concerned that this will incite vandalism or theft, so after construction, nearby plants will be flagged instead to indicate to staff their location).
- If necessary, outplanting of propagules from the same population inside the fenced enclosure will occur. This is likely to be out-sourced to a consultant such as NTBG.
- An example of *Dubautia kalalauensis*, a PEPP plant, occurs well away from the entire project. No fence or project activities will occur in this area.
- A specimen of *Polyscias flynnii* (E, PEP) is safely within the fenceline and will not be damaged during construction. The plant or an adjacent plant will be marked with tape during pre-construction surveys. IE staff and fence contractors will be required to carry, at all times, a map showing the location and / or GPS points. No trimming of the tree will be allowed. A 10m buffer zone around the tree will be observed, with no construction activities allowed in that area.
- A culvert will be inserted into the fence if required in areas that might act as a watercourse during heavy rain, to avoid flooding which might wash out plants.
- BMPs to protect against the ingress of invasive species are outlined in section 17.4.3.
- Proper footwear (spiked/corked boots or tabis) will be worn by personnel (applies to all BMPs)
- There will be strategic placement of wood or plastic boards, webbing, or other simple trail infrastructure in areas where mud pits or slides may form (applies to all BMPs)
17.4.2. BMPs - Plant Protection—Rapid ‘Ōhi’a Death (ROD)

The spread of Rapid ‘ōhi’a Death (ROD) to local ‘ōhi’a trees could lead to a major ecological disaster through Kaua‘i. Local trees could potentially contract ROD due to staff or contractors bringing the disease to Kauai through tools or clothes. Impacts will be completely avoided using BMPs during construction work outlined by the College of Tropical Agriculture and Human Resources, UH at Manoa:

- Staff and contractors will not move ‘ōhi’a wood or ‘ōhi’a parts inter-island. If ‘ōhi’a trees need to be removed as part of fence construction, they will be taken to the nearest location suitable for incineration immediately.
- Tools used for cutting ‘ōhi’a will be cleaned with 70% rubbing alcohol, a proven cleaning measure. This is particularly important if the tools may have come into contact with infected trees, but should happen regardless. A freshly prepared 10% solution of chlorine bleach and water can be used as long as tools are oiled afterwards, as chlorine bleach will corrode metal tools. Chainsaw blades will be brushed clean, sprayed with cleaning solution, and run briefly to lubricate the chain.
- Gear (including shoes, packs and clothes) will be cleaned before and after entering forests in a non-forest environment with running water. All soil will be brushed off shoes then sprayed with 70% rubbing alcohol. Clothes will be washed with hot water and soap. This will also help to reduce the spread of invasive species. A buddy system will be initiated where partners check each other’s gear.
- Vehicles will be washed with soap after off-roading or after picking up mud from driving. A pressure washer with soap will be used to clean all soil off the tires and vehicle undercarriage.
- If staff have visited infected islands, they will take additional precautions of washing all field clothing, boots and tools in Sterigene before returning to the site. Staff will be asked to sign an agreement to this effect, since the severity of the consequences if ROD reaches Kaua‘i.

17.4.3. BMPs - Plant Protection—Invasive Species

Risks to native plant ecosystems could occur should non-native invasive plants be accidentally introduced/reintroduced by staff or contractors. This could lead to the spread of invasive species to surrounding forested areas.

Impacts will be completely avoided using BMPs during construction work as follows:

- Cleaning boots, clothes, packs and gear between site visits to ensure that seeds are not carried from or to other areas and using a buddy system to ensure that this occurs.
- Keeping soil and vegetation disturbance to a minimum
- Where disturbance is unavoidable, staff will monitor bare ground and ensure invasive species are removed.
- Invasive species monitoring and removal within the fence will happen on a quarterly basis with waste hauled off site and destroyed
• Staff will be trained to recognize invasive species and to report them to project manager so that an action plan can be drawn up if new invasive species are encountered, if necessary.
• Vehicles will be washed with soap after off-roading or after picking up mud from driving. A pressure washer with soap will be used to clean all soil off the tires and vehicle undercarriage.
• Tools used in other areas will be cleaned thoroughly before use in or around the site.

17.4.4. BMPs - Plant Protection during Predator Control

As noted above, the overall effect on plants of the Kahuama’a Seabird Preserve is likely to be positive. However, the risk to rare and listed plants from the need to enter the preserve to monitor rodent eradication equipment, especially during the initial phase of eradication, could be:
- Trampling, erosion, disturbance
- Alteration to native habitat
- Frequently traveled transects will experience increased disturbance and erosion risk
- Listed or rare plants risk being trampled or disturbed

Impacts will be completely avoided using BMPs as follows:

• Listed or rare plants will be identified and flagged. IE staff will be required to have a map and / or GPS point of listed or rare plants with them at all time while in the field.
• Personnel will be encouraged to tread lightly and to remain on trails rather than cutting through vegetation.
• If listed or rare plants are thought to be at particular risk of trampling because of their location near a trap or bait box, the trap or bait box will be moved. If this is not possible, the plant will be protected by a small fence.
• No live feral cat trapping or barn owl control will occur within 10m of known listed plant species to avoid harm to those species.

17.4.5. BMPs - Plant Protection during Monitoring Work

Risks to listed or rare plants could be:
- Listed or rare plants risk being trampled or disturbed during burrow monitoring, camera installation and auditory / visual surveys.

Impacts will be completely avoided using BMPs as follows:

• Prior to the commencement of the work, pre-construction surveys will have identified the presence of any rare or listed plants. These will be marked and mapped and staff will be required to carry a map and / or GPS will the location of the plants. If necessary,
protective mini-fences will be placed around specimens to ensure that they are not accidentally trampled.

- Cameras will not be placed on natural burrows within 10m of listed plant species to reduce traffic and disturbance.

17.4.6. BMPs - Plant Protection during Habitat Restoration

Risks to listed and rare plant species during invasive species removal and vegetation restoration could be:

- Disturbance and uprooting.
- Loss of sediment
- Soil instability
- Erosion
- Risk being trampled or disturbed during invasive plant species removal
- Accidental introduction of additional invasive species
- Bare ground following invasive removal being recolonized by invasive species
- Herbicide affecting native plants
- *Myrsine knudsenii* being mistaken for Strawberry Guava

Impacts will be completely avoided through the following BMPs for erosion control.

- In steep grade areas (>25%), clearance will be conducted by hand rather than with machinery.
- Vegetation clearance will be timed for periods of good weather as far as practically possible.
- To minimize risk of increased erosion in freshly disturbed areas during rainfall events, re-vegetation will occur as soon as possible after clearing and within 3 months, using with suitable native grass outside the fence.
- Clearing will not be conducted during heavy rain.
- If damage to vegetation and substrate is likely to occur during monitoring activities in certain areas, boardwalk sections will be placed over the area.
- Control of key seabird habitat modifiers especially in the maintenance phase will be accomplished by mechanical means (i.e. physically removing) with hand tools over the use of herbicides where possible. Large patches of seabird habitat modifiers will not be removed all at once to avoid leaving large areas of bare soil. Where this is not possible, erosion and weed control cloths will be put down if appropriate.
- Where required, herbicides will be applied following instructions at minimum volumes, rather than broadcast, and during prolonged spells of dry weather where possible and never during periods of heavy rainfall. Whenever possible (expected to be most cases), small volume bottle applicators, which delivers herbicide in very small quantities, will be used
- These identified herbicides are classified as ‘general use’ and not ‘restricted use’ but will need to be applied under a herbicide application permit. Personnel conducting these
activities will adhere to all label restrictions and guidelines. Non-native vegetation removal BMPs may be improved or adapted as new technologies become available.

- All plant waste will be black bagged at the point of removal (rather than carrying off site and dropping seeds) then removed and destroyed off site in a lowland facility. Dead blackberry stalks will be left in situ to deter in ingress of other non-natives.
- Specific plant locations (e.g., UTM coordinates) will not be revealed in the public review.
- Where invasive species are within 10m of listed plant species, herbicides will not be used.
- Currently, trails at the site are based on botany surveys and lead to rare plants. IE staff will discontinue the use of these trails to avoid rare plants and establish a new route to and around the site.
- DOFAW/PEPP staff will continue to monitor individual plants long term.
- Project staff will be trained on plant identification by State or Federal botanists.
- Staff will receive training so that they can tell the difference between native / listed plants and invasive plants. Staff will carry an identification guide while undertaking plant work.

17.5. WATER COURSE, DRAINAGE & EROSION

17.5.1. BMPs – Watercourse, Drainage, Erosion Protection

During fence construction, BMPs will be employed to minimize erosion, sedimentation and contamination of aquatic environments (e.g. streams) in the project area.

Contaminations
The proposed bait for the rat stations is diphacinone. The project site is more than 200m from any known water source and diphacinone in this bait form is almost insoluble in water.

Erosion and Sedimentation
Figure 17.1 shows the topography at the site which contributes to the risk of erosion.
Figure 17.1. 3D Map showing topography at the site.

Risks to listed and rare plant species, listed seabirds and natural habitat could be:

- Disturbance and uprooting.
- Erosion might compromise the exclusion of predators from the fence
- Erosion of soil particles into watercourse could damage fish and other freshwater habitat species
- Bait dragged out of the boxes by rodents could fall into water courses and drainage areas.

Impacts will be completely avoided as follows:

**Erosion**

- In steep grade areas (>25%), fence clearing will be conducted by hand rather than with machinery.
- To minimize risk of increased erosion in freshly disturbed areas during rainfall events, clearing will not occur more than 1 week prior to construction.
- Clearing will not be conducted during heavy rain.
- Prior to disturbance, erosion control devices including (but not limited to) sand bag barriers, trenches, geotextile, filter fabric, vegetation matting, and rubber water guides will be put in place if required. Small trenches (≤ 2 m in length) will be dug from the fenceline during the fence installation process to divert water away from the fence if required.
- Sandbags, trenches, and water guides will be inspected daily during construction activities and monthly for the 30-year duration of the Program.
• Cleared areas will be outplanted within 3 months after construction with native grass.
• BMPs to protect against the ingress of invasive species are outlined in section Error! Reference source not found.

Contamination
• The minimum amount of bait will be used to achieve additional rat eradication.
• Project staff will remove all bait found outside of the bait stations and either dispose of it or replace it in a bait box
• Bait stations will only be used inside the fence
• Bait will be placed on metal sticks inside the bait boxes
• Fueling of project related equipment (chainsaws) will take place away from the aquatic environment. Absorbent pads should be stored on-site to facilitate clean-up of accidental petroleum spill should a release occur.

17.6. CULTURAL / ARCHAEOLOGICAL

17.6.1. BMPs – Cultural / Archeological – all aspects of project
Risks to any possible sites could be:
• Damage or destruction to archaeological remains and features
Impacts will be completely avoided using BMPs during pre-construction work as follows:
• An archaeological survey will be commissioned and carried out by a suitably qualified consultant.
• The survey report will be provided to the State Historic Preservation Division. Their advice will depend on the results of the survey. Based on that advice, additional BMPs may need to be added to ensure that cultural resources are not affected.
• Immediately before and after ground clearing activities, a cultural and archaeological monitor will inspect the area.
• Immediately before and after ground clearing activities, a cultural and archaeological monitor will inspect the area.
• If archaeological or human remains are discovered during the construction of the fence or the clearing of non-native weeds, work in the area will cease and the Division of State Parks archaeological staff and / or Burials Program of the State Historic Preservation Division will be immediately notified. They will liaise with project staff on how to proceed.
• All staff (including the fence contractors) will be given oral and written instructions pertaining to archaeological and cultural sites.
18. APPENDICES

Appendix 1: KESRP Data Sheet

**Time start and survey duration:** Dusk surveys start at sunset, and survey duration is 2 hours. Dawn surveys start 2 hours before sunrise and duration is 90 min. Surveys are split into 30 minute sessions, with 5 minutes allotted for weather data, 25 for auditory, and 5-10 for concurrent night vision if available.

**Location:** Use a GPS and record ~ error in m. Create a waypoint for your location with year (2 digits), Julian date (3 digits), initials (2 letters), and time (AM/PM), e.g. **09125JHPM**

**Weather:** Use code descriptions. Use geographic reference points (how high are adjacent cliffs compared to clouds?) and make comments about cloud activity at height.

**The target circle:** Take 5 min to draw in major features and bearings. Confirm major directions to geographic features.

**What is a call?** A call is a single **unbroken** note or series of notes. Where there is a pause any subsequent call is treated as a new and separate call (regardless of if you perceive it to be the same bird). ≥2 birds calling at the same time are treated as separate calls. If a site is so active that it is impossible to accurately count calls/minute, 25 is recorded in the multiplier column and “uncountable” is recorded in the comments.

**Data to be collected:**

1. **Time:** 2400 clock, min scale. Tally calls with same distance and direction in that minute.
2. **Quadrat:** One of 8 regions you heard the call based on direction.
3. **Distance:** The approximate distance from the listener to the caller. Distance is broken into 5 basic categories – 0-50m (1), 51-200m (2), 201 – 500m (3), 501-1000m (4). Distance can also be recorded in 100m (e.g. 1=100). **NOTE:** also include 50m as (0.5). Data will be treated in 4 basic categories. **If you find that this scale (i.e. calls up to 1000m) is inappropriate (e.g. birds calling on ground close by) include additional distance estimate in comments.**
4. **Behavior:** The direction the bird is flying TOWARDS if it is possible to determine. This can become somewhat subjective to determine if the call is > 500m, or if only partial notes are heard. 1=North, 2=NE, 3=East, etc.. 9=circling, 10=stationary/ground, 11=transit. **If you hear ground calling, record a bearing!**
5. **Elevation:** Either below (1), same / approx. equal height to observer (2) or above (3). Leave blank if unknown or indeterminate.

6. **Species:** Leave blank if NESH. If any other species record as 4-letter codes based on first and second names.

7. **Comments:** Based on footnote system – use numbers in cell and record comments in space below.
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USFWS. 2017a. Appendix II. Modelling Methods and Results used to Inform the Newell’s Shearwater Landscape Strategy. U.S. Fish and Wildlife Service.


Kahuama’a Seabird Preserve Management Plan


20. PERSONAL COMMUNICATIONS

Katie Cassel, 2017, Founder and Manager, Kōke‘e Resource Conservation Program.

Spencer Engler, 2017, Habitat Conservation Plan Compliance Technician for First Wind, Makamaka’ole Seabird Preserve.

Wendy Kishida, 2017, Kauai PEPP Coordinator, Kauai Plant Extinction Prevention Program.

Dr. Andre Raine, 2017, Manager, Kauai Endangered Seabird Recovery Project.

Galen Reid, 2016, Predator Control Specialist, DOFAW.


Adam Williams, 2017, DOFAW.

Dr. Lindsay Young, 2017, Vice President and Executive Director, Pacific Rim Conservation.
APPENDIX B: COVERED SPECIES BIOLOGICAL DETAILS

This appendix to the KSHCP contains the biological details on distribution, abundance, population trends, life history, habitat and threats to the Covered Species in the KSHCP. The information presented in this appendix serves to support the conservation actions and assumptions of the Program.

1. ‘A’o

The ‘a’o or Newell’s Shearwater (Puffinus newelli) is endemic to Hawai‘i and most of the current-day population breeds on the island of Kaua‘i. The species is listed as ‘Threatened’ under Federal and State of Hawai‘i endangered species laws and ‘Endangered’ on the International Union for Conservation of Nature (IUCN) Red List of Threatened Species (Birdlife International 2010). The ‘a’o belongs to the Puffinus genus of small shearwaters which includes the Manx shearwaters (Puffinus puffinus) and the Townsend’s Shearwaters (Puffinus auricularius).

The ‘a’o is a small, black and white shearwater with a dark tail (Figure 1-1). As with most shearwater species, the ‘a’o has a dark narrow bill with a slightly hooked tip. While some taxonomists describe it as a Manx-type shearwater based on size and general plumage similarities, others describe it within the Little/Audubon’s group based on the extent of white plumage on the sides of the rump and black upperparts (Onley and Scofield 2007). In flight, the ‘a’o displays rapid wing beats, often flies close to the water and with little soaring (Onley and Scofield 2007).

Figure 1-1. The ‘a’o – Newell’s Shearwater. Photo B Speigel, SOS.
The ‘a’o was thought to be extinct by 1908 but was later rediscovered in 1947. In 1967, the species was confirmed breeding on Kaua‘i when a hunter’s dog killed one and brought it to the hunter. He reported it to the authorities. John Sincock and Gerald Swedberg then searched for the birds, finding their burrows and further predations.

In subsequent years, fledglings became attracted to, and disoriented by, an increase in urban lighting and became grounded (King and Gould 1967, Sincock and Swedberg 1969). An effort to decrease mortalities associated with light attraction led to the formation of the “Save Our Shearwater” (SOS) rehabilitation center in 1978 by the U.S. Fish and Wildlife Service and the State of Hawai‘i, Department of Land and Natural Resources. Records from the ~30,000 shearwaters to go through SOS from 1978-2016 have been used in population modeling and to understand population trends (Ainley et al. 2001a, Day et al. 2003b, Raine et al. 2017c). Initial colony monitoring was done on low elevation colonies in the early 1980s (Telfer 1986) and some of these same sites were later revisited in the 1990s in studies assessing reproduction (EPRI 1995a, b). Radar surveys began in 1993 to quantify Newell’s movement from sea to land at several locations around the island and are continue to this day.

This long-term data set has been used to plot population trends (Raine et al. 2017c). Since 2006, regular auditory surveys, acoustic monitoring, and nest searching by the Kaua‘i Endangered Seabird Recovery Project led to the discovery of large colonies of ‘a’o in the northwest mountains of Kaua‘i (KESRP, unpubl. data) A large amount of research and monitoring of ‘a’o colonies from 2011 to the present has been funded through the KIUC Short Term Habitat Conservation Plan (HCP), as well as through the National Fish & Wildlife Foundation, State Wildlife Grants and additional funding sources. Through this program, and due to increased focus on species recovery, there has been a significant effort to locate all breeding colonies on public lands and where private landowners allow access. The largest gap in data is on land owned by the Robinson family (~20% of total land mass on the island of Kauai), where no surveys have been permitted.

1.1. Distribution, Abundance, and Population Trends of the ‘A’o

The ‘a’o is endemic to the Southeastern Hawaiian Islands. The island of Kaua‘i supports the largest current-day breeding population of the ‘A’o, estimated at up to 90% of the total population (Ainley et al. 1995a, USFWS 2011), while smaller populations are known to breed on the islands of Hawai‘i and Maui. O‘ahu, Lāna‘i, and Moloka‘i (Day and Cooper 1995, Reynolds and Ritchotte 1997, Day et al. 2003a, Onley and Scofield 2007, VanderWerf et al. 2007, Natividad Bailey 2009, McKown and Savage 2015).

The Kaua‘i Endangered Seabird Recovery Project (KESRP), the program primarily responsible for conducting research on the ‘a’o and ‘ua‘u on Kaua‘i, has conducted auditory surveys to detect ‘a’o breeding calls and track relative calling densities. This information, in conjunction with identified breeding colonies provides the known distribution of the ‘a’o on Kaua‘i. The ridges and...
slopes along the northwest coast of Kaua’i display the highest levels of ‘a’o breeding activity (Figure 1-2) (Banfield et al. 2013, Raine and McFarland 2014b, a).

![Map of ground calling locations, indicating Calling Hotspots and breeding activity on Kaua’i. ‘A’o (in blue), the ‘ua’u (in red), and the ‘akē‘akē (in yellow) (KESRP).](image)

Figure 1-2. Map of ground calling locations, indicating Calling Hotspots and breeding activity on Kaua’i. ‘A’o (in blue), the ‘ua’u (in red), and the ‘akē‘akē (in yellow) (KESRP).

The species’ pelagic range is not fully understood. During the breeding season the species is typically found foraging on the ocean a short distance to the west and north of the southeastern Hawaiian Islands (Onley and Scofield 2007). ‘A’o are observed at sea in warmer areas of the Tropical Pacific with a strong, deep thermocline, more cloud cover, less mixing in the water column and where trade winds are less developed. They are typically found foraging approximately 800 miles south and east from nesting colonies on Kaua’i in the deep-water regions of the Equatorial Counter Current, and more specifically, the Inter-tropical Convergence Zone, to the north (up to 25º N), and east (to about 120ºW) of the Hawaiian chain (Spear et al. 1995). Juvenile ‘a’o have been tracked after fledging at over 1,400 miles to the southwest of Kaua’i with longer tracks extending to over 2,700 miles to the southwest. Adult ‘a’o have been tracked taking differing routes from the fledglings after the breeding season, with one individual following the Northwest Hawaiian Islands, and the other moving southeast of the main Hawaiian Islands (Raine et al. 2015a, Raine et al. 2017a).
At-sea surveys conducted in the central and eastern tropical Pacific between 1980 and 1994 (Spear et al. 1995) estimated the total ‘a’o population at 84,000 (95% CI = 57,000-115,000) including juveniles and subadults. An updated assessment based on survey data collected by the National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NOAA-NMFS) Southwest and Pacific Islands Fisheries Science Centers from 1998 to 2011, estimated the total ‘a’o population at 27,011 (95% CI = 18,254-37,125) including juveniles and subadults (Joyce 2013). With an approximate 90% of the total population based on Kaua’i, this estimate can be adjusted to 24,310 individuals on Kaua’i. It should be noted that these studies consisted of different data sampling techniques and statistical analyses from each other, therefore the studies are not directly comparable. Each study provides an estimate of the at-sea population of Newell’s Shearwaters during the respective sampling periods.

The population of ‘a’o is estimated to have declined by 94% (at an average rate of ~13% per year) from 1993-2013 (Raine et al. 2017c) and is predicted to continue to decline (Griesemer and Holmes 2011b). Populations of ’ua’u are estimated to have declined by 78% (at an average rate of ~6% per year) during the same period (Raine et al. 2017c).

In line with these measurements, auditory surveys have confirmed a restriction of the species’ breeding range. Surveys have shown significantly lower levels of breeding activity at three previously highly active colonies (Kalaheo, Anahola, and Makaleha), and the probable extirpation of others (e.g., Kaluahonu) (Ainley et al. 1995b, Holmes and Troy 2008)(KESRP, unpublished data).

Reducing the population estimate based on a range of presumed predation rates (see Appendix E: Social Attraction Estimator Model) yields a current 2016 population estimate of 13,049-17,172 individuals. Assuming a stable age distribution (Ainley et al. 2001b), the population size range presented above would include approximately 8,312-10,938 birds of breeding age.

### 1.2. Life History and Habitat Selection of the ‘A’o

The ‘a’o breeding season begins in late March/early April, when birds return to colonies (Ainley et al. 1997a, Zaun 2007, Deringer and Holmes 2009) (Figure 1-3). The ‘a’o exhibits high site and mate fidelity. Higher rates of ‘a’o calling are detected during this period when non-breeding individuals are also concentrating at breeding areas (Deringer 2009).
Figure 1-3: Breeding phenology of the ʻuaʻu (HAPE) and the ʻaʻo (NESH) on Kauaʻi adapted from Deringer (2009). NB = non-breeders. Outlier observations indicated with “X”s.

A pre-egg laying exodus follows in late April, and egg-laying occurs in June. Pairs produce a single white egg with an average incubation period of between 53 and 55 days. Incubation is shared by both parents (Ainley et al. 1997b). After hatching, both parents participate in feeding their chick, with one adult making short foraging trips (every 1-3 days) while the other adult makes long trips (can be away for up to 12 days) (Zaun 2007) (KESRP unpublished data).

Juveniles will not emerge from the burrow until just 12-20 days before fledging. The fledging period ranges anywhere from 81 to 94 days after hatching (Zaun 2007). Fledging occurs between late September through early December with peak fledging levels in October (Ainley et al. 1997b, Raine and McFarland 2014b, a). Fledglings depart nests from after sunset to before sunrise with a peak in the first few hours after dark (KESRP, unpublished data).

Juveniles will spend the majority of time at sea, returning to their natal areas only to prospect for mates and burrow sites between year two to five. ‘Aʻo begin reproducing at 6 years of age (Brooke 1990, Ainley et al. 2001b).

Shearwater reproductive success, measured as the percentage of successful fledglings per eggs laid, per year, ranges between 40-70% in similar species around the world (Brooke 2004). Griesemer and Holmes (2011b) report that the mean reproductive success of burrowing Procellariformes for studies equal to or greater than three breeding seasons was $0.32 \pm 0.17SD$ (n=17) in areas where predators were present and was $0.62 \pm 0.08SD$ (n=9) for areas where predators were eradicated. KESRP conducted a study in Upper Limahuli Preserve, a site in Kauaʻi protected by an ungulate proof fence (from 2009) and managed by NTBG, where predator control for rats and cats is taking place. Fledging success for ʻaʻo went from 54.5% in 2011 to a high of 88.2% in 2015 from nests where breeding was confirmed; ʻuaʻu breeding fledging success went from 0.01% in 2011 to a high of 64.5% in 2016. The study looked at over 100 nests. During this time period, predator eradication has increased steadily in effort and efficiency (Raine et al. 2017g). In the modeling efforts of Ainley et al. (2001b), a breeding probability of 54.7% was determined. This is low when compared to reported values for other Procellariformes and it is likely to be caused by mortality from adult predations and powerline collisions (Telfer 1986, Ainley et al. 2001b).
Survivorship of ‘a’o has been estimated in population viability modeling efforts at 0.905 (Ainley et al. 2001a) to 0.92 (Griesemer and Holmes 2011a, USFWS 2017b, a). Juvenile (sub-adult) survivorship was estimated at 0.333 by Ainley et al. (2001a) based on long term studies on the Manx shearwater (Brooke 1990) and other species related to the ‘a’o. ‘A’o capture prey by diving after fish schools and are often seen in association with big predatory fish, such as tuna that cause smaller prey species to swim up to the surface. When under water, ‘a’o can swim to depths of over 45m to pursue prey. An analysis of the stomach contents of ‘a’o fledglings collected dead beneath power lines showed a composition of 0.1-0.3% shrimp-like crustaceans, 0.1-4% fish, and 96-99% squid, most of which were ommastrephid (flying) (37-57%) and pyroteuthid (fire) squid (7-16%), and exocoetid (flying) fish (<0.1-1.7%) (USFWS 1983, Harrison 1990, Ainley et al. 1997b, Ainley et al. 2014, USFWS 2016b).

Breeding colonies are typically located at high elevations in areas of open native forest dominated by ‘ōhi’a lehua (Metrosideros polymorpha) with a dense understory of ‘uluhe fern (Dicranopteris linearis) (Figure 1-4). Current-day breeding sites are restricted both geographically and in terms of elevation from what they once were, and historically the ‘a’o may have bred at lower-elevation sites (Mitchell et al. 2005, Pyle and Pyle 2009).

Nests, consisting of burrows dug into the ground, are most commonly placed at the base of trees, where the substrate may be easier for the birds to excavate. Some colonies on Kaua’i are located in steep slopes above sheer cliffs (Wood and Holmes 2008), where birds are presumed to nest in rock crevices rather than burrows.

Vegetation at active ‘a’o breeding colonies was composed of 25-35% native tree canopy, and 75-85% native shrub and fern layers (Holmes and Troy 2008, Holmes et al. 2009). Studies investigating the microhabitat characteristics of known colonies suggest that sites distinguished by steep slopes, moderately rocky hard soils, and low nonnative vegetation are the most suitable nesting habit (Troy et al. 2014, Troy et al. 2016).
Figure 1-4: ‘A’o and ‘ua’u habitat: ʻōhiʻa lehua tree root structure for burrows. Photo: P Belson.

Figure 1-6: ‘A’o and ‘ua’u habitat: ‘uluhe fern with burrow. Photo: A Raine.
1.3. Threats to the Continued Existence of the ‘A’o

The primary threats to the ‘a’o population include: light attraction; collisions with utility structures predation at their breeding sites by introduced mammalian and avian predators; breeding habitat loss and alteration caused by invasive plants and introduced ungulates; public use; urban development; at-sea factors affecting their prey-base; global climate change; and stochastic events.

Other threats include climate change and its affects to both seabird adult survivorship and recruitment by generally affecting food availability (Oro 2014). Each of these factors is discussed below in more detail in Section 1.1.4.

2. ‘Ua’u

The ‘ua’u, or Hawaiian Petrel (Pterodroma sandwichensis) is endemic to the Southeastern Islands of Hawai‘i. The ‘ua’u is listed as ‘Endangered’ under Federal and State of Hawai‘i endangered species laws and is classified as ‘Vulnerable’ on the IUCN Red List of Threatened Species (Birdlife International 2007). The ‘ua’u was once considered a subspecies of the Dark-rumped Petrel (Pterodroma phaeopygia) but was split taxonomically based on morphology and breeding range (Brooke 2004, Onley and Scofield 2007). The Dark-rumped Petrel has since been renamed and is now referred to as the Galapagos petrel (Pterodroma phaeopygia), a species endemic to the Galapagos Islands.

The ‘ua’u is a stout, medium-sized petrel with light underparts, dark upperparts, and white feathers on the forehead, around the bill, lower cheeks, chin and throat (Figure 1-7). It is one of the larger species in the Pterodroma group, with longer, more pointed wings than congeners but with heavier shorter wider wings, shorter deeper bill, and a shorter dark tail than Galapagos Petrel (Onley and Scofield 2007). The grayish-black bill is relatively short and stout, with a sharp, decurved tip. In flight, ‘ua’u demonstrate characteristic Pterodroma dynamic soaring with high-sweeping arcs and a rhythmic rocking “pendulum” motion (Onley and Scofield 2007).
2.1. Distribution, Abundance and Population Trends of the ‘Ua’u

The ‘ua’u only breeds in the Southeastern Hawaiian Islands. It is thought that the species once bred on all the main islands of Hawai‘i, except Ni‘ihau (Simons 1985, Mitchell et al. 2005). Current-day breeding populations are primarily on the island of Maui, particularly in Haleakalā National Park, and on the island of Kaua‘i at high-elevation nesting colonies. Smaller populations breed on the islands of Hawai‘i and possibly Moloka‘i (this has not been confirmed). There is also a large breeding population on the island of Lāna‘i (Day et al. 2003a, Onley and Scofield 2007, Tetra Tech 2008, Holmes and Joyce 2009, Natividad Bailey 2009, Pyle and Pyle 2009, Raine et al. 2017h).

KESRP has conducted auditory surveys on Kaua‘i which indicate calling concentrations and breeding locations. This information, in conjunction with breeding colonies identified on the ground provides the currently known distribution of the ‘ua’u on Kaua‘i. The ridges and slopes along the northwest coast of Kaua‘i display the highest levels of ‘ua’u breeding activity. Figure 1-2 illustrates calling hotspots and the sites where breeding activity was documented by KESRP (Banfield et al. 2013, Raine and McFarland 2014b, a).

Based on at-sea survey data, Spear et al. (1995) estimated a total ‘ua’u population of 19,000 (10,600 – 34,400) individuals and an estimate of 4,500 to 5,000 breeding pairs (Spear et al. 1995, Ainley et al. 1997a). Joyce (2013) estimated a population abundance equal to an average of
52,000 individuals using at-sea data collected over the more recent sampling period of 1998-2011 (Joyce 2013). The estimates from Joyce (2013) and Spear et al. (1995) are not directly comparable due to differences in survey locations (i.e., longitudinal and latitudinal) and timing in regards to breeding phenology; however, together the studies provide an estimate of the at-sea population of ‘ua’u at the different time periods.

The Kauai subpopulation was estimated at 1,200 (Pyle and Pyle 2009) to 1,600 breeding pairs (Ainley et al. 1997a). Overall population estimates are currently being revised, but recent data suggests that Kaua’i may contain a much more significant portion of the world breeding population of the ‘ua’u than the predicted by early earlier estimates (Raine, 2017, pers. comm).

Studies informing the population trends of the Hawaiian Petrel on the island of Kaua’i indicate the population has declined. Recent radar data analyses for Kaua‘i indicate a >78% decline in ‘ua’u numbers during the period from 1993-2013 (Raine et al. 2017c)

2.2. Life History and Habitat Selection of the ‘Ua’u

The ‘ua’u breeding season on Kaua‘i begins in April when birds return to the island to commence breeding. The ‘ua’u, like many petrels, displays a high degree of site and mate fidelity; nesting pairs return to the same nesting burrow year after year. They enter and exit their burrows only under the cover of night as a defense against potential predators (Simons 1985). Most pairs visit burrows for just a few nights at the beginning of the season before going on exodus. Figure 1-8 summarizes the annual breeding phenology for the Kaua‘i population of the ‘ua’u, adapted from (Deringer 2009); ‘ua’u is coded as “HAPE” in this figure.

Figure 2-8: Breeding phenology of the ‘ua’u (HAPE) on Kaua‘i adapted from Deringer (2009). NB = non-breeders. Outlier observations indicated with “X”s.

Prior to egg-laying and incubation, adult ‘ua’u depart the nest for approximately three weeks to build up fat and nutrient reserves prior to egg laying (females) and incubation (males) (Harris 1966, Perrins and De L. Brooke 1976). Parental care from both sexes is necessary to rear a single nestling.
Egg laying begins at the end of April. Breeding females lay a white egg each year. Incubation typically begins immediately after laying and lasts 54-58 days (Simons and Hodges 1998). Both adults take shifts lasting several days at a time, thus relieving the other adult to feed.

Once a chick hatches, in July or August, it remains in the nest and depends on parental care for approximately four months (Simons 1985, Simons and Hodges 1998, Mitchell et al. 2005). Fledgling occurs in the fall months; adults and juveniles depart the breeding colony in late November-mid December, remaining at sea for several months before adults and sub-adults return the following spring. ‘Ua‘u breeding on the islands of Hawai‘i, Maui, and Lāna‘i fledge young earlier (early November) than those breeding on Kaua‘i (mid November, early December) (Simons and Hodges 1998, Natividad Bailey 2009, Raine et al. 2017h). Fledglings will not return to land for 2-5 years. The Hawaiian petrel begins reproducing at 6 years of age (Simons and Hodges 1998).

Petrel diets typically include squid, fish, crustaceans and plankton found at the surface (Simons and Hodges 1998). Largely nocturnal in their hunting habits, ‘ua‘u skim the upper surface of the water for prey driven to the surface by other seabirds and marine predators. Studies of breeding petrels at Haleakalā National Park on Maui found ten different prey types obtained from three classes of marine organisms (Simons 1985, Harrison 1990).

The ‘ua‘u nests in burrows, crevices in lava, and under ferns. Nesting habitat on Kaua‘i appears structurally similar to known breeding sites on Lāna‘i (Penniman 2010, Wiley et al. 2012). On Lāna‘i, ‘ua‘u burrow primarily in fern beds (VanZandt et al. 2014, Raine et al. 2017h). In comparison, nest burrows on Maui and Hawai‘i islands are found at high elevation sub-alpine sites (e.g., at Haleakalā: 3000m elevation and <10% vegetation coverage) between lava rocks. Based on auditory surveys and burrow searching conducted by KESRP on Kaua‘i, the ‘ua‘u burrows at high-elevation sites comprised of predominantly wet montane forest of native vegetation, under ‘Ōhi‘a and Lapa lapa trees, similar to that of used by the ‘a‘o but typically higher in elevation (Holmes and Joyce 2009).

As described by Troy et al. (2016), when compared to ‘A‘o, ‘ua‘u burrows are associated with softer soils, lower surrounding vegetation and are closer to wind exposed ridges. ‘Ua‘u burrows also show a wider range in habitat characteristics. As with other forest-dwelling seabirds around the world, a fern-dominated understory provides a softer landing for petrels, and the interspersed tree roots provide suitable soil structure for burrow excavation (Holmes and Wood 2007).

2.3. Threats to the Continued Existence of the ‘Ua‘u

The primary threats to the ‘ua‘u population on Kaua‘i include power line collisions, light attraction, predation at breeding sites, breeding habitat loss and alteration, disease, and at-sea
factors affecting prey availability, global climate change, and stochastic events. Each of these factors is discussed in more detail below.

3. ‘Akē’akē

The ‘akē’akē, or Band-rumped Storm-petrel (*Oceanodroma castro*), is a small, highly pelagic storm-petrel of the Family Hydrobatidae. The ‘akē’akē is listed as endangered under the Federal ESA, as well as the State of Hawai‘i endangered species law. The Hawaiian population of the ‘akē’akē was once recognized as a distinct subspecies. However, taxonomists now consider this population as sympatric with various other Pacific Ocean populations (Onley and Scofield 2007).

In 2011, the USFWS, as part of its review of the species for potential listing, determined that the Hawaiian breeding population of the Band-rumped Storm-Petrel constitutes a distinct population segment (DPS) based on geographic and distributional isolation from other Band-rumped Storm-Petrel breeding populations in Japan, the Galapagos Islands, and the Atlantic Ocean. Further, the USFWS determined that the Hawai‘i population segment is considered “significant” in that its loss would constitute a significant gap in the range of the taxon (USFWS 2015). The Hawaiian population of the Band-rumped Storm-Petrel is the only population within U.S. borders or under U.S. jurisdiction.

The ‘akē’akē is a very small seabird with a total length of about 20cm and weighs 33-67g. The plumage of the ‘akē’akē is overall blackish-brown, with a sharply defined narrow white band across the “rump.” Its tail is slightly notched and may appear almost squared, unlike most other members of Hydrobatidae, which are more deeply notched (Harrison 1990) (Figure 1-9). Its bill is dark and long.
3.1. Distribution, Abundance, and Population Trends

The ‘akē’akē species is widely distributed, occurring in both the Atlantic and Pacific oceans and in both tropic and sub-tropic waters. However, the Atlantic and Pacific breeding populations are considered distinct and are unlikely to intermingle due to the species’ aversion to overland flights.

‘Akē’akē populations across the Pacific are isolated from each other. Extensive at-sea surveys of the Pacific near Hawai’i have revealed a broad gap in distribution of the ‘akē’akē to the east and west of Hawai’i (del Hoyo et al. 1992, Slotterback 2002, Naughton et al. 2005). The Hawai’i population of the species is considered a distinct breeding population (USFWS 2015).

In addition, KESRP in 2016, KESRP participated in genetic study with the Queens University, Ontario. In the study, ‘akē’akē from Kaua’i were compared with other ‘akē’akē from around the world. The results suggest that birds from Kaua’i are genetically distinct from other populations (Taylor et al. in prep).

The ‘akē’akē is thought to have been common on all the Main Hawaiian Islands when Polynesians arrived about 1,600 years ago (Mitchell et al. 2005, Naughton et al. 2005, Spear and Ainley 2007). As evidenced by abundant ‘akē’akē bones found in middens on the island of Hawai’i, and in excavation sites on Lehua, O’ahu, and Moloka’i, ‘akē’akē once were numerous enough to be used as a source of food and possibly for feathers (Mitchell et al. 2005, VanderWerf et al. 2007). The arrival of humans in the islands likely contributed to the decline of ‘akē’akē populations (Naughton et al. 2005).
The total global population of the Band-rumped Storm Petrel is estimated at approximately 150,000 individuals (Brooke 2004). Kaua’i supports most of the breeding population of Hawai’i although the exact number is unknown. The small size of the birds and the cryptic nature of their burrows, assumed to be on steep rocky cliffs and within the crevices of old lava flows, makes burrow searching through the usual means difficult and has further hampered population estimates (Raine et al. 2017b).

Though no nest has yet to be identified, human auditory surveys, automated acoustic surveys and mist netting data were used by Raine (Raine et al. 2017b) to create a predictive distribution model based on key habitat variables. Based on these and previous survey data, breeding is occurring primarily in the steep, remote cliffs areas of the Nā Pali coast in the northwest region of the island, Waimea Canyon, Hanapēpē Valley, rocky cliff faces of the vegetated valleys of Wainiha and Lumahai, and Lehua Islet (Wood et al. 2002, Raine et al. 2017b). KESRP has captured multiple birds along the Na Pali coast and Waimea Canyon in recent years with brood patches, strongly suggesting multiple breeding colonies on Kaua’i. Additionally, retrieval of downed fledglings on Kaua’i in the fall further points to local nesting locations (VanderWerf et al. 2007, Holmes and Joyce 2009).

There is evidence of potential breeding also on Maui, Hawai’i, Lehua and Kaho’olawe (Johnston 1992a, b, Wood et al. 2002). Breeding has recently been confirmed on the slopes of Mauna Loa on Hawai’i (Galase et al. 2016), and on Lehua Islet a single, mummified fledgling was found in 2002 (VanderWerf et al. 2007). Specimens of the ‘akē’akē have been collected from Ni’ihau and Lehua and small numbers of adults (less than 10) have been heard on or seen flying around Lehua in 2002, 2003, and 2004 (Slotterback 2002, VanderWerf et al. 2007). Small breeding populations of unknown size are assumed to exist within barren lava flows at the tops of volcanoes like Haleakalā on Maui and Mauna Loa on Hawai’i (Harrison 1990).

3.2. Life History and Habitat Selection

Breeding phenology of the ‘akē’akē on Kaua’i is derived from the same data sources described above for distribution (Raine et al. 2017b). Breeding birds return to nest sites in May and complete egg laying by mid-June, and incubate until the beginning of August (Raine et al. 2017). The incubation period averages 42 days and fledging occurs 70 to 78 days after hatching (Harris 1969). Fledglings typically depart the nest site between mid-September and late November, with peak fledging in October (Raine et al. 2017b). ‘Akē’akē reach breeding age in 3-7 years (Ainley 1984, Harrison 1990). Based on acoustic data, adults are believed to leave the nesting grounds in October as well (Raine et al. 2017b).

During the non-breeding season, some birds apparently remain near their breeding islands, while others undertake long-distance movements of unknown extent. The ‘akē’akē has been detected west of the Galapagos Islands during spring but not during autumn counts; >620 miles north of Hawaiian Islands during summer surveys; and >990 miles south of Hawai’i in the
Phoenix Islands, as well as the entire distance from the Hawaiian Islands to Japan (Slotterback 2002, Mitchell et al. 2005).

‘Akē’akē are classified as part of the nocturnal petrel feeding guild that catch prey by dipping into the ocean surface on the wing, or pattering the water with their feet, frequently consuming prey while floating on the water (Harrison 1990). Observations of foraging birds indicate the species feeds at internal wave crests, where prey is caught at or just below the surface (Spear and Ainley 1997, Mitchell et al. 2005). Its preferred foraging habitat may coincide with ocean depth or upwellings based on observations that 90% of individuals and 75% of all occurrences of the ‘akē’akē were at upwellings (del Hoyo et al. 1992, Mitchell et al. 2005, Naughton et al. 2005). Based on stomach samples, prey includes small fish, squid, and crustaceans. These samples contain prey normally found in deeper water that migrate vertically to the surface at night (Slotterback 2002). Stomach samples from the Galapagos consist primarily of small fish (1.4-1.9 inches long) and squid with few crustaceans. No stomach samples have been collected from ‘akē’akē of the Hawaiian Islands (Mitchell et al. 2005).

Preferred nesting habitat for the ‘akē’akē breeding population on Kaua‘i include crevices and holes, often located along protected ledges on sheer cliffs and dry mesic cliffs. (Wood et al. 2002, Raine et al. 2017b). Plant communities in the vicinities of possible nesting areas include shrubs and grasses, common herbs, randomly distributed tree species, and dry mesic cliff species (Wood et al. 2001a, Wood et al. 2001b). Raine et al. (2017b) predicts highest occurrence of breeding in areas with low rainfall, little to no vegetation and greater than 40-degree slopes.

### 3.3. Threats to the Continued Existence of the ‘Akē’akē

The primary threats to the ‘akē’akē population on Kaua‘i include predation at breeding sites, breeding habitat loss and alteration, light attraction and power line collisions, disease, and at-sea factors affecting prey availability, global climate change, and stochastic events that are inherently a hazard to populations with a limited range. Each of these factors is discussed in more detail below.

### 4. Threats Affecting Covered Seabirds

Present day populations of seabirds in Hawai‘i are much smaller than the previously rich and abundant avifauna that originally evolved on the isolated Hawaiian Islands with no terrestrial predators (Olsen and James 1982, Mitchell et al. 2005). The primary threats to the seabird populations on Kaua‘i include predation on breeding areas, breeding habitat loss and alteration, light attraction and power line collisions, disease, at-sea factors affecting the seabird prey-base, global climate change, and stochastic events. These factors are discussed below. The following sections describe threats that apply to ‘a’o, ‘ua‘u, and ‘akē’akē populations on Kaua‘i.
4.1. Predation at Breeding Colonies

One of the most serious threats to the survival of seabirds on Kaua‘i and the other MHI is depredation of adults, eggs, and chicks by introduced predatory species, including rats, cats, mongoose, pigs, and the barn owl (Mitchell et al. 2005, Griesemer and Holmes 2011b, Holmes et al. 2011). Rats prey on seabird eggs and chicks, and populations of storm-petrels in New Zealand and Japan have been completely extirpated due to rat predation alone (Jones and Byrd 1979, Hasegawa 1984). Feral cats, as well as barn owls, are known to kill the adults and nestlings of the endangered seabirds of Kaua‘i (Telfer 1986, Ainley et al. 1997a, Ainley et al. 1997b, Holmes et al. 2011, Raine et al. 2017b). Based on colony monitoring data from several breeding seasons, Ainley et al. (1995) and Telfer (1986) report concluded evidence that cats, rats, and owls were responsible for a decrease in adult and juvenile shearwater survival.

Evidence of seabird predation by rats, cats, barn owls, and pigs was documented at all sites monitored by KESRP from 2011 through 2016 (Raine and Banfield 2015, Raine et al. 2017f, d, g, e, Raine et al. 2017h).

Seabird breeding burrows monitored by KESRP were commonly frequented by rats; in Upper Limahuli Preserve, one seabird burrow was visited by a rat 490 times over the span of 5,015 hours of recording (Raine and McFarland 2014a). Cats frequented seabird burrows to a lesser extent than rat visitations, though individual cats have been documented on cameras predating the adults and chicks from multiple nests in a matter of days (Raine and Banfield 2015).

Depredation by feral cats at nesting sites on Kaua‘i has been heavily documented on camera by KESRP, with an individual predator able to decimate a nesting colony and lead to colony extirpation, particularly when adults are affected (Igual et al. 2009, Raine and Banfield 2015). Several non-native animals, which can access the dry cliff nesting sites, are thought to prey on the ‘akē‘akē. These include feral cats, the small Indian mongoose on the Hawaiian Islands other than Kaua‘i, the non-native barn owl, and both Black and Polynesian Rats. A dead adult ‘akē‘akē was discovered in Nualolo Aina in 2014 that had been depredated by a Barn Owl (A. Raine, 2017, pers. comm.). Rat bones were also collected at abandoned ‘akē‘akē nest sites on Kaua‘i and storm-petrel species elsewhere in the Pacific have been significantly affected by predation (Wood et al. 2002).

The mongoose (Herpestes javanicus) has decimated seabirds and other native fauna on the other MHI and poses a high level of threat to all native fauna on Kaua‘i if the species becomes established on the island. To date, the mongoose has not been reported as present at active seabird conservation sites despite intensive camera monitoring. Historically, a female mongoose was reportedly found dead along a road in 1976 near Kalaheo, and sightings have since been reported intermittently all over Kaua‘i. Until recently it was thought that the mongoose was not established on the island of Kaua‘i. However, in 2012 two mongoose were captured in the vicinity of the Nāwiliwili harbor, with another recently captured at the Lihue airport in October 2016 (http://www.kauaiisc.org/mongoose/). The Kaua‘i Invasive Species Committee (KISC) encourages the public to report sightings of mongoose and each year lists multiple sightings as ‘credible’. Early detection of new threats, and management of introduced predators and feral...
animals will continue to be vital to the recovery of the ‘ua’u, ‘a’o, and the ‘akē’akē on Kaua’i and elsewhere in the MHI (Hodges and Nagata 2001, Mitchell et al. 2005, Holmes et al. 2011).

Ungulate species such as feral pigs, goats, and deer, roaming forests and mountain slopes, can destroy or damage burrows and the vegetation surrounding them. In addition, feral pigs also eat eggs, chicks, and adults, and destroy the entire burrow in the process of reaching the birds at the end (Raine and McFarland 2014a). These feral species have played a significant role in modifying the breeding habitat of the ‘ua’u and the ‘a’o populations, and in exterminating seabird colonies in the Pacific and many locations worldwide (Harrison 1990, Le Corre et al. 2002, Igual et al. 2009, Furness 2012).

4.2. Habitat Degradation

Seabird nesting habitats on Kaua’i and the other MHI have been severely degraded by the presence of invasive plants (Mitchell et al. 2005, Naughton et al. 2005, Holmes and Troy 2008). Plants such as Cyathea cooperi, Hedychium spp., Albizia falcataria, Psidium spp., and Rhodomyrtus tomentosa continue to displace and out-compete native vegetation in some of Kaua’i’s native mesic and wet forest areas. The presence of feral ungulates facilitates the spread and establishment of invasive plants, and accelerates soil erosion and habitat degradation which can destroy important breeding habitat. Grazing and trampling caused by pigs, goats, and deer both alter the vegetation structure and composition, which then can facilitate the dispersal of non-native predators into new areas following ungulate trails.

Many historic petrel and shearwater nest sites on Kaua’i are no longer active due to both the presence of introduced predators and the alteration of native vegetation structure and composition. For example, the Kaluahonu seabird colony located in southeastern Kaua’i once thrived but is now dominated by nearly pure and impenetrable stands of Psidium spp., Hedychium spp., and Rhodomyrtus tomentosa. In the early 1980’s this colony was found to be active and was monitored (Telfer 1986, Ainley et al. 2001a). However, a decade later biologists documented a significant drop in the number of breeding pairs at the Kaluahonu (Ainley et al. 2001a). Intensive surveys conducted by KESRP between 2006 and 2008 indicated that the colony has since been extirpated (Holmes and Troy 2008).

Holmes and Troy (2008) report that non-native vegetation cover was greater at inactive seabird colonies colony sites (Z=-1.98, P=0.047). When habitat composed of native vegetation is invaded by non-native plant species, vegetation structure is often dramatically altered, and shearwaters cannot access the ground readily to undertake breeding activities (e.g., burrow excavation, mate attraction). Non-native vegetation may also be a proxy for higher abundance of pigs, cats, and rats. Invasive plants, such as Strawberry Guava, provide food that support higher numbers of seabird predators. Proximity to human disturbed areas is another factor that accelerates habitat degradation and loss by increasing both light levels and the relative abundance of invasive plants and predators.
4.3. Light Attraction

Artificial lights can disorient and alter normal nocturnal flight behaviors in seabirds. This phenomenon, known as “light attraction,” is characterized initially by an alteration in the birds intended flight path and circling of the light source, often ending with “fallout” when a bird is grounded at a location that it normally would not have landed (Reed et al. 1985, Telfer et al. 1987, Hallman and Holmes 2010). Once grounded, birds may experience difficulty taking flight again without clear “runways”, cliffs, and updrafts. Grounded birds can suffer injury, starvation, predation, or collision (e.g., with vehicles).

Petrels and shearwaters around the world are negatively affected by “light attraction,” (Montevecchi et al. 2006) - seabirds have been documented flying towards open fires and lighthouses and colliding with lights and nearby structures for hundreds of years (Avery 1979, Reed et al. 1985, Montevecchi et al. 2006). Fledglings are more affected than adults - most downed birds are fledglings grounded during their first flights from their natal nests towards the ocean (Rodríguez et al. 2017). Light-induced fatality of seabirds is recorded worldwide on at least 47 islands and three continental locations, across all oceans (Rodríguez et al. 2017). At least 56 out of the 113 burrow-nesting petrel species have been recorded grounded by lights (Rodríguez et al. 2017) and twenty-four grounded species are globally threatened according to IUCN criteria. Approximately 21 of 80 species in the order Procellariiformes are reported as being attracted to lights; many of those affected are endangered or threatened petrels and shearwaters (Imber 1975, Reed et al. 1985, Montevecchi et al. 2006).

Attraction and disorientation of seabirds at sea have also been reported, primarily on ships using artificial lighting for fisheries purposes, but also at oil platforms (Rodríguez et al. 2017) and at cruise ships (Rodríguez et al. 2015).

On the island of Kaua‘i, seabird fallout from the effects of light attraction has been known to occur for more than three decades (Telfer et al. 1987). In 1978, the State of Hawai‘i Department of Land and Natural Resources (DLNR) initiated a community-based conservation effort, called Save Our Shearwaters (SOS), in which members of the public are asked to pick up fallout seabirds and turn them into “aid stations” located around the island (Telfer et al. 1987). The effort has continued since, currently funded by KIUC and slated to be continued under the long-term KIUC HCP. SOS has proven successful at engaging the island residents to retrieve fallout seabirds; since its inception, SOS has received some 32,000 seabirds (DLNR 2012). Moreover the SOS has program provided valuable information regarding the patterns and trends of seabird fallout over the years (DLNR 2016).

Of the Covered Seabirds, the ‘a‘o is the species most affected by light attraction fallout and is recovered by the SOS program. ‘A‘o make up over 90% of downed seabirds found on Kaua‘i each year, but ‘ua‘u are also turned into the SOS program. The petrels are less affected by light attraction, or may be breeding in colonies where their flight path to the ocean does not intersect with bright lights (Raine et al. 2017c). Far fewer ‘ua‘u and ‘akē‘akē are found grounded in comparison to the ‘a‘o (Telfer et al. 1987, Day et al. 2003a, DLNR 2016). Between the years 2000-2015, 24 ‘akē‘akē were recovered on Kaua‘i by SOS, likely from the effects of light
attraction. It is possible that many more are affected since their small size may make them especially susceptible to scavenging and increasingly difficult to find and report after fallout events.

A wide range of light pollution sources can individually and cumulatively affect seabird behavior including those at athletic parks and stadiums, airports, harbors, streets, parking lots, resorts, industrial facilities, cruise ships, individual homes, and car head lights (Reed et al. 1985, Le Corre et al. 2002, Raine et al. 2007).

While cause and effect relationships are complex and not fully understood, some factors appear to contribute directly, indirectly and cumulatively to the relative sensitivity of petrels and shearwaters to artificial night lights. These factors include physiology, nocturnal behavior, behavioral experience (i.e., age), weather, lunar phase, and light intensity (Reed et al. 1985). Light attraction is a complex phenomenon and there may be factors other than those listed above that have yet to be discerned.

4.3.1. Physiology and Nocturnal Behavior

Nocturnal seabirds often feed on bioluminescent prey, a feeding strategy that is associated with high light sensitivity (Montevecchi et al. 2006). Nocturnal species, like the ‘a’o, tend to have larger eyes that contain more rods and rhodopsin than diurnal species, (McNeil et al. 1993). In addition, nocturnal species orient flights with specific star patterns (Reed et al. 1985). Artificial light is thought to reduce or interfere with a nocturnal seabird’s ability to navigate using celestial cues.

4.3.2. Age

Fledglings are significantly more sensitive to light attraction than adult seabirds as they take their first flight from nest sites to the sea (Telfer et al. 1987, Ainley et al. 1995b, Le Corre et al. 2002). Adults experience attraction to lights, based on observation of circling birds prior to the fallout season, but there are many fewer adult birds turned into the SOS program, suggesting less fallout from more experienced birds. However, adult seabirds may be more vulnerable to the effects of light attraction when bright lights are present close to breeding colonies, such as the significant fall-out events at the Koke‘e Air Force Station in 2015 (Raine 2015, Raine et al. 2015b).

4.3.3. Lunar Phase

Lunar phase is undoubtedly a critical component of the life history of nocturnal seabirds (Imber 1975, Telfer et al. 1987, Montevecchi et al. 2006, Rodriguez and Rodriguez 2009). Nocturnal departure from nest sites provides a survival advantage for adults and fledglings. However, the presence of artificial lights at night appears to interfere with these natural behaviors. Holmes
(2010) compared SOS program fallout data and moon phase over 30 years showing that moon cycles and SOS program peak fallout levels are significantly correlated. SOS program data indicate that fledgling fallout increases during the new moon phase, when artificial light intensity is higher relative to moon light, and decreases during the full moon phase while the small numbers of adults downed increases during the full moon period (Figure 1-10; DLNR 2012, Telfer et al. 1987, Rodriguez and Rodriguez 2009, DLNR 2016).

![2015 T&E Bird Fallout vs. Moon Illumination](image)

**Figure 4-10**: 2015 Threatened and Endangered (T&E) seabird fallout and moon illumination.

### 4.3.4. Light Intensity

Telfer et al. (1987) report that the number of fledgling seabirds that fallout and are turned into the SOS program on Kaua‘i is strongly related to the number and distribution of lights (i.e., light intensity or amount of upward radiation) that attract seabirds. The Covered Seabirds appear most attracted to the actual source of the light (i.e., the bulb), but are also affected by ambient, or reflected, light (Reed et al. 1985, Telfer et al. 1987). Additionally, multiple sources of high intensity lights can draw birds down to lit areas (Hailman 1979, Reed et al. 1985, Reed 1987, Telfer et al. 1987, Podolsky et al. 1998).

Hallman and Holmes (2010) conducted a short pilot study on Kaua‘i with ornithological radar to measure changes in the numbers and flight behavior of ‘a‘o and ‘ua‘u in the presence and absence of a major artificial light source. On nights before and after the use of high intensity lights, 90 and 97% of radar targets (i.e., individual seabirds) were observed flying in a straight line. This would be defined as a “normal” flight pattern. However, on nights when high intensity...
lights were used, 79% of the birds flew in straight lines but 21% displayed circling and erratic flight behavior associated with light attraction and fallout.

Troy et al. (2011) developed a GIS-based method to model the intensity of artificial light and aerial visibility to fledgling seabirds as they fly to the ocean (to estimate the degree of threat that artificial light poses to these birds). The two models suggest that there are few to no portions of Kaua‘i from which young birds could fledge and not view light on their post-natal nocturnal flights. Although the north shore of the island is among the darkest, it also supports the highest densities of Covered Seabird breeding colonies and therefore represents a high risk area to fledglings if light visibility is not reduced and managed. The GIS models developed by Troy et al. (2011) can facilitate risk assessment at the colony scale so that land managers can more efficiently determine where to allocate limited resources to protect birds.

The areas on Kaua‘i with the lowest light intensities are those that support the largest remaining ‘a‘o and ‘ua‘u breeding populations (Figure 1-11). Areas on the northwest coast are the farthest away from areas with highest light intensities. Currently efforts are being made to define a No Light Conservation Zone (NLCZ) located on the northwest quadrant of Kaua‘i (USFWS 2016). The NLCZ would essentially encompass the largest contiguous area on the island with no viewable lights and access to the coast. This would help to identify sites that are most suitable for management.
4.4. Collisions with Utility Structures

Collisions with utility structures are a known threat to seabirds in the Hawaiian Islands. On Kaua‘i, utility structures include power lines (energy electrical transmission and distribution lines) and associated structures. Specifically, the power lines traverse the island and are largely above ground, consisting of poles and wires that extend to more than 100 feet tall. Collisions between birds and these facilities have been documented and the effects of these collisions on the population have been estimated to negatively impact the Covered Seabirds (Ainley et al. 1995a, Griesemer and Holmes 2011a, Travers et al. 2012, Travers et al. 2014, Travers et al. 2016). Areas in the northwest region of Kaua‘i were evaluated as the least likely to be impacted from threats of lights and power lines, based GIS mapping for proximity to overhead power lines, monitoring data, and wildlife agency analysis.

The types of injures that have been documented on downed birds of the Covered Seabirds include broken spines vertebrae and limbs, and concussions, often leading to death. Loss of plumage waterproofing due to shearing off of feathers during a collision can also negatively impact seabird survival (T. Anderson, 2016, pers. comm.). When a breeding adult is killed or injured during the incubation or chick provisioning period, the likelihood of complete nest failure is very high because the remaining adult is not able to incubate or care for the chick alone. Seabird nestlings depend on a steady supply of food from both parents. In cases when this does not occur, fledgling survival is reduced, as during chick-rearing, the chick would receive less food and the survival of the chick would be lower because fledgling survival increases directly with body mass (Brooke 1990). Unfortunately, power line collisions are more likely to occur with breeding adults, as they are transiting back and forth from the colony to the ocean feeding grounds on a nightly basis to provision chicks.

4.5. Disease

Introduced avian diseases, such as avian malaria, pose threats to all native Hawaiian fauna (Mitchell et al. 1995). Human activities, as well as those of ungulates and non-native birds and mammals, can facilitate the spread of disease. After finding evidence of avian malaria in a blood sample of a juvenile ‘ua‘u in the 1960’s (Warner 1968) posited that avian malaria and other mosquito borne diseases may have had serious impacts to already the vulnerable native Hawaiian seabird populations. Subsequent testing of a small number of ‘ua‘u by van Riper III and Barbee (1978) and Simons (1985) did not find any evidence of avian malaria infection. Although the extent to which avian malaria has impacted the survival of the Covered Seabirds is unknown, recent research suggests that blood parasites are often absent or rare in seabirds (Quillfeldt et al. 2010). However, in recent years the SOS program has opportunistically recorded avian...
malaria in a ‘ua’u and avian pox in individuals of the Covered Seabirds and further research is planned to better assess this potential threat.

4.6. At-sea Threats

During their time at sea, the Covered Seabirds encounter many dangers that include threats posed by the fishing industry, the presence of marine debris, light pollution, oil spills, and the presence of persistent chemical pollutants such as heavy metals and organochlorines in the food chain (Olsen and James 1982, Harrison 1990, Mitchell et al. 2005).

The true extent of impacts from fisheries on the Covered Seabirds is unknown, but many seabird species are heavily affected by mortality and injury (termed “bycatch”) caused by fishing methods and equipment (Furness 2003). Fishing can also cause reduced density of prey aggregations available to seabirds (Spear and Ainley 2007). Overharvesting of skipjack (Katsuwonus pelamis), and yellowfin tuna (Thunnus albacares) could eliminate predatory fish needed to drive small prey species to the surface where they are available to foraging seabirds. Such a factor would increase required prey searching and foraging effort by seabirds to provision offspring, ultimately affecting annual reproductive success and adult seabird survival. The ‘a’o is not as efficient in flight as other ‘tuna birds’ (Spear and Ainley 1997), therefore increasing prey search is especially perilous to this species.

Ocean debris harms a variety of marine biota, including fishes, turtles, birds, and mammals by causing entanglement and ingestion (Azzarello and Van Vleet 1987, Laist 1987). Industrial and user-plastics composed of polystyrene, polypropylene, polyethylene, Styrofoam, and polyvinyl chloride have become widespread sources of marine pollution that disperse and accumulate in response to surface currents, wind patterns, and different geographic inputs (Azzarello and Van Vleet 1987). Procellariformes are most vulnerable to the effects of plastic ingestion due to their smaller gizzard and their inability to regurgitate ingested plastics. The recent work by Kain et al. (2016), found that the frequency of ingestion of plastics in ‘a’o fledglings has increased since the 1980’s from 11%-50%, with 70% of the plastics classified as microplastics. The physiological effects related to the ingestion of plastics include obstruction of the gastro-intestines, blockage of gastric enzyme secretion, diminished feeding stimulus, lowered steroid hormone levels, delayed ovulation and reproductive failure (Azzarello and Van Vleet 1987).

Oil spills and pollution events within the water column and on the surface can cause mortality of adult and juvenile seabirds at any time of the year and are best managed through effective prevention plans and rapid response and containment. Oil spills can have particularly devastating effects on small populations when a release occurs at locations and times of the year when species are congregated in a small area, such as in waters near breeding colonies, or at sea where seabirds feed or raft. Though heavy metal content in the Covered Species has not been investigated, seabirds feeding on mesopelagic prey, as the Covered Species do, have been found to have increased mercury levels (Ochoa-Akuna et al. 2002, Elliot and Elliot 2016).
Sources of light pollution at sea include lights on fishing vessels, cruise ships, as well as offshore petroleum and gas facilities (IDA 2003, Van De Laar 2007, Rich and Longcore 2013). These types of at-sea facilities can affect the normal foraging and predator avoidance behaviors of seabirds (Weir 1977, Wiese et al. 2001).

4.6.1. Global Climate and Biome Changes

Anthropogenic environmental changes are one of the most pressing contemporary threats to global biodiversity. Changes in the earth’s climate and biomes from human industrial activity are expected to result in regional changes in weather patterns and ocean productivity that are further predicted to affect seabird populations as well as other plant and animal communities in Hawai‘i.

Changes anticipated in Hawai‘i may include, but are not limited to, increased thermal stratification of the ocean, increased frequency of El Niño conditions, and changes in ocean productivity (Sarmiento et al. 2004). Rising average temperatures on the islands in the last 30 years, in line with global trends, has also been documented (Giambelluca et al. 2008). Furthermore, seabird breeding habitat could be affected by increasingly severe weather events (e.g., increased storm frequency caused by increased El Niño frequency, increased drought intensity). Invasive plant species are also expected to spread with increased temperatures (IPCC 2014). A rise in sea level of approximately 1m is anticipated by the end of the 21st century within the State of Hawai‘i (Fletcher 2009), but this rise in sea level is not expected to directly affect known nesting habitat of the Covered Seabirds.

4.6.1.1. Changing Ocean Conditions and Seabird Foraging

An El Niño/Southern Oscillation (ENSO) event is characterized by anomalous sea surface temperature warming along the equator in the eastern Pacific Ocean and cooling in the west (Philander 1990). These events have global impacts on climate and usually occur every three to seven years. In Hawai‘i, ENSO events are characterized by dry winter conditions, weaker trade winds, and increased frequency of hurricanes near the islands (Chu 1995, Chu and Wang 1997, Cao et al. 2007). With climate change, there is an expected increase in frequency of extreme ENSO events and associated disastrous weather events (Cai et al. 2013, Latif et al. 2015). The frequency of tropical cyclones is expected to increase ~20-40% during ENSO events (Chand et al. 2017). While changes to natural systems globally and regionally are generally predicted with a degree of confidence (Bernstein et al. 2007), predicting effects at a local scale and to specific species is difficult. However, some predicted climate change scenarios could impact the Covered Species. One of the most likely things to be directly impacted via changes in climate patterns is at-sea foraging. Polovina et al. (2011) present a useful “biome” change model to analyze changes in ocean productivity relating to climate change. Their “biomes” correspond to distinct areas of phytoplankton density which is associated with different physical drivers like gyres and upwelling (Figure 1-12).
Figure 4-12: System of gyres and currents in the North Pacific. The main Hawaiian Islands are circled in red. The red arrow points to the Transition Zone where the subpolar and subtropic gyres mix. Figure credit: http://www.seos-project.eu/modules/oceancurrents/oceancurrents-c02-p04.html

With regards to the temperate feeding grounds of the ‘ua’u and possibly the ‘akē’akē, Polovina et al. (2011) predict that the productive temperate biome of the North Pacific, which corresponds with the subpolar gyre productivity zone, could contract by 34% by year 2100. Decreasing arctic sea ice during the summer appears to be decreasing winter winds across the North Pacific (Jaiser et al. 2012). This leads to less sea surface cooling during winter and less mixing at the transition zone (TZ) between the nutrient rich subpolar gyre and nutrient poor subtropic gyre which leads to less primary production and a north shifted TZ (Bond et al. 2015, Whitney 2015). Shifting of known ‘ua’u foraging areas at the TZ would take place with a projected 30% subtropical biome expansion, and the previously mentioned temperate biome reduction (Polovina et al. 2011). In short, Hawaiian Petrels would have to fly farther north to reach historically used foraging locations.

Change in wind patterns and evidence of shifting biome size has already been observed (Polovina et al. 2008, Polovina et al. 2011, Bond et al. 2015, Whitney 2015). Ichii et al. (2011) found that flying squid populations, a preferred prey of the Covered Seabirds, have been shown to respond quickly to shifts in productivity zones. These shifts can have dramatic results for higher trophic level predators. In 2014, large scale die-offs of Cassin’s Auklets, a species that relies on the productive food web, were documented related to warming (Opar 2015). Many other anomalies, like large whale and sea lion mortalities, have been documented in other species related to this period of warming oceans (Bond et al. 2015, Di Lorenzo and Mantua 2016).
With regards to the known feeding areas of the ‘ā’o, ‘ua’u, and ‘akē’akē along the Equatorial Counter Current, the size of the biome is expected to contract by 28% by year 2100. Primary production is expected to increase by 17.1% within this biome but the reduction in area could shift productive zones and make foraging more difficult for the Covered Seabirds. Production is also expected to shift east, and tuna, a predator that ‘ā’o associate with when foraging, are expected to decrease in waters west of 170°E (Bell et al. 2013). There is known foraging habitat of the ‘ā’o west of 170°E and the act of tuna driving prey closer to the surface is very important to Newell’s foraging success (Au and Swedberg 1966, Spear et al. 1995, Raine et al. 2015a, Raine et al. 2017a). The subtropical biome, which likely provides more local foraging for the Covered Species, is also expected to increase primary production by 26% by 2100. Though with an increase in total area of 30%, productive zones could be more patchy and foraging success could be affected (Polovina et al. 2011).

Surman et al. (2012) found that migratory bird species appear to have more difficulties adapting foraging to oceanographic variability. Also, increases in sea surface temperature, even at smaller temporal scales (i.e. daily), appear to impact foraging success and chick growth in the related Wedge-tailed Shearwater (Peck et al. 2004).

Changes in marine organism distribution is also likely to occur in response to expanding low oxygen, low productivity zones in the ocean (IPCC 2014). With warming surface waters, growth of low oxygen zones is more likely to occur (Altieri and Gedan 2015). Expansion of low oxygen zones that already occur in the North Pacific and around the Northwestern Hawaiian Islands would directly impact the Covered Species (Polovina et al. 2008). These factors are also expected to cause the body mass of a variety of fishes to decline (Cheung et al. 2013). This could also affect the food abundance and availability for the Covered Seabirds.

Ocean acidification is another outcome of human industrial activity. Since the beginning of the industrial revolution, atmospheric carbon dioxide has increased by nearly 40% from burning fossil fuels and deforestation. Oceans have taken in about a third of the carbon dioxide produced and this has disrupted chemical balances in the oceans and made them more acidic (Doney et al. 2009). Marine ecosystems are expected to be impacted by the predicted increase in ocean acidification, though with different responses from different taxonomic groups (Kroeker et al. 2013). From experimentation, mollusks, including squid, show slowed development and decreases in larval survival, growth, and abundance with increased acidification (Kaplan et al. 2013, Kroeker et al. 2013). Other groups, like diatoms and fish, may benefit from acidification though it is difficult to predict how all these groups will respond in the complexity of a natural system (Kroeker et al. 2013).

4.6.2. Changing Habitat Conditions and Nesting

Climate change is expected to bring an increase in the intensity of storms (Knutson et al. 2010). Hurricanes can have a large effect on the native species of Hawai‘i. The impact of Hurricane Iniki may have pushed three endangered forest bird species to extinction. Hurricanes also have an
impact on the Covered Species, as Hawaiian hurricane season is during their breeding season. Downed trees and debris could easily block birds from burrows or trap them inside. Following Hurricane Iniki in 1992, aerial surveys were conducted that found heavy vegetation damage and landslides at known ‘a’o colonies. At Kilauea Point, the closely related Wedge-tailed Shearwater was found to have suffered 30-40% chick loss from the hurricane (Day and Cooper 2002).

In the cloud forests of Maui, native and non-native plant species “temperature tolerance zones” are expected to shift upward approximately 400m (Loope and Giambelluca 1998), assuming the projected rise in air temperature at sea level of 2-2.5°C likely by 2060 (Joshi et al. 2011). This is likely to occur as the documented warming on Hawai‘i continues (Giambelluca et al. 2008, Keener et al. 2012). Additionally, trade winds, which bring precipitation to Hawaiian windward coasts, have decreased since the 1970s (Collins et al. 2010).

Although difficult to predict, studies suggest a decrease in rainfall across the Hawaiian Islands, with a larger contrast in precipitation between the drier leeward sides versus the wetter windward sides (Timm et al. 2016). Decreases in precipitation combined with higher temperatures could increase the spread of non-native species which has potential to alter the breeding habitat of the Covered Seabirds (Bernstein et al. 2007, IPCC 2014). This will allow more invasive plant species to live in montane forests than currently do. The warmer temperatures may also be beneficial to introduced plants that are better adapted for nighttime respiration at higher temperatures than the native plants of the cloud forests (Alward et al. 1999).

This decreased rainfall has the potential to increase drought resulting in increases in forest fires (Hawai‘i 2014). Along with the aforementioned increase in cyclones, these types of disturbances are more dramatic and can allow faster colonization by invasive species. All of these changes are expected to allow invasive species to more easily invade native forests and alter habitats (Loope and Giambelluca 1998).

5. Honu – Green Sea Turtle

5.1. Distribution and Population Trends of the Honu

The honu is one of seven sea turtle species found globally (Eckert et al. 1999). In 1978, the honu (Chelonia mydas) was listed as threatened under the Endangered Species Act (ESA) throughout its global range (NMFS and USFWS 1998, 2007). This listing was revised in 2016 with a ruling that designated a status for 11 “distinct population segment (DPS);” the Hawaiian population that is in the North Pacific population DPS was listed as threatened (USFWS 2016a). Honu are fully protected under Hawai‘i Revised Statues Chapter 195D and Hawai‘i Administrative Rules 13-124. The Hawaiian honu as a “subpopulation” is currently listed as “least concern” by the International Union for the Conservation of Nature (IUCN) a change in status from “endangered” that reflects updated scientific evaluation of the honu population in Hawai‘i (Pilcher et al. 2012).
Adult honu average 3 to 4 feet in length and can weigh up to 200 pounds (NMFS and USFWS 1998). Honu can live up to 80 years of age. The term "green" applies not to the external coloration, but to the color of the turtle's subdermal fat (NMFS and USFWS 1998). The color of an adult carapace (shell) is light to dark brown, sometimes shaded with olive, with radiating wavy or mottled markings of a darker color or with large blotches of dark brown (Figure 1-13).

**Figure 5-13:** Female honu or Hawaiian Green Turtle laying a nest. Photo www.turtletracks.org.

The honu in Hawai‘i nests primarily in the French Frigate Shoals of the Northwestern Hawaiian Islands and to a lesser degree on the main Hawaiian Islands (Balazs et al. 2015, NMFS and USFWS 2015). The French Frigate Shoals population constitutes 96% of the total Hawaiian Islands population, with the nesting habitat on the main Hawaiian Islands having been severely contracted by habitat loss and modification for commercial construction (USFWS 2016a).

Long-term monitoring of honu populations has been undertaken in Hawai‘i, with over 40 years of data showing that the Hawai‘i population has increased at a rate of approximately 5.7% annually since the harvest limits were imposed in 1974, (under State of Hawaii regulation 36), following near extinction (Chaloupka and Balazs 2007, Maison et al. 2010, Tiwari et al. 2010). In 2015, the current number of breeding females was estimated at around 4,000 individuals (Balazs et al. 2015). The number of nesting Green Sea Turtles at East Island at French Frigate Shoals has tripled since monitoring began in 1973 (Figure 1-12) (NMFS and USFWS 1998, Balazs and Chaloupka 2004b).
Figure 5-1: Estimated number of Hawaiian green turtles nesting at East Island, French Frigate Shoals, NWHI, 1973-2011. Table source: NMFS Pacific Islands Fisheries Science Center Marine Turtle Research.

Habitats needed for honu nesting, basking, underwater resting, and foraging are found along the shores of all the main Hawaiian Islands. Monitoring by State of Hawai‘i staff biologists and NOAA volunteer observers has documented increasing levels of honu nesting on Kaua‘i. Terrestrial basking by honu is also reportedly on the rise in the other main Hawaiian Islands. On Kaua‘i, there are an estimated eight basking and twenty nesting beaches used by honu (Parker and Balazs 2015). Some of the known nest locations are near urbanized coastal areas along the east and south shores of Kaua‘i where coastal light pollution exists.

5.2. Life History and Habitat Selection of the Honu

Hawaiian honu reach breeding age at approximately 25 years. Females return to the same beach, or region of coastline, where they hatched to lay their eggs (Balazs 1980, NMFS and USFWS 1998, Balazs and Chaloupka 2004b). Females return to nesting beaches on Kaua‘i from mid-May through late August to lay eggs in the nests excavated in beach sand. During the cool of the night, females arrive on the beach and upon reaching the high-tide mark use front flippers to dig a wide pit, into which they carefully dig an egg chamber using rear flippers. Within the chamber approximately 100 leathery-skinned ping-pong-ball-sized eggs are deposited and covered with sand.
Once finished laying eggs, the female returns to the sea and will not return to care for the eggs or hatchlings. Female honu lay eggs every two to three years and will deposit three to six clutches per nesting season with an average of twelve days in between. The eggs will incubate in the sand for 60-65 days (Balazs 1980, NMFS and USFWS 1998, Balazs and Chaloupka 2004a). Depending on the lay date, hatchlings can emerge from nests in July through late November-early December (Balazs 1980).

Honu hatchlings dig upward in a communal effort to reach the surface, an effort that may take 2-3 days to complete. Hatchlings typically emerge from the sand at night (Balazs 1980; NMFS and USFWS 1998). Newly emerged hatchlings are strongly photopositive and can be disoriented away from their path to the sea by artificial lighting (Witherington 1992, NMFS and USFWS 1998). Hatchling mortality levels are high particularly during the first hours of emergence due to many causes (Gyuris 1994). The young turtles are thought to stay in the open ocean for the next 5 to 10 years before they begin foraging in nearshore habitat (Parker et al. 2011).

Young oceanic turtles and adults, which occasionally forage in the open ocean, feed on pyrosomes, various species of sea snails, amphipods, and different species of cnidarians (Parker et al. 2011). In nearshore habitat, the preferred foraging areas are generally protected or partially protected bays where benthic macroalgae grows, a preferred food source (Balazs et al. 1987, NMFS and USFWS 1998). Honu that have grown large enough to reside in the nearshore benthic environment have an almost entirely herbivorous diet consisting of selected macroalgae and sea grasses.

Honu feed most actively at dawn and dusk and alternate between periods of active foraging and rest (Balazs et al. 1987, NMFS and USFWS 1998). During these rest periods, they retreat to deeper water and seek out shelter in caves and outcroppings. These resting areas are usually within 1.2 miles of foraging areas and at the edge of the coastal bench surrounding the Hawaiian Islands. Turtles may also rest in vertical holes or crevices in the reef flat. Turtles can spend long periods underwater while resting; resting times up to 2.5 hours have been recorded for adult turtles (Balazs et al. 1987).

Behavioral changes have been observed in the population over time, which are probably a direct consequence of the success of management and conservation actions in Hawai‘i. For example there have been changes since the early 1980’s in foraging strategies and habitat use from predominately deep night-time foraging to daytime nearshore waters and an increased scope and magnitude of basking events and tolerance to humans (Whittow and Balazs 1982, Balazs 1996, Parker and Balazs 2010).

5.3. Threats Affecting the Honu

The 2016 final listing ESA ruling by the USFWS identified the biggest threats facing the population of honu found in the Hawaiian Islands as habitat loss and degradation, fisheries bycatch, ingestion of marine debris, vessel activities, disease, and predation. Predation of
hatchlings by feral cats is known to be a problem for sea turtles in other nesting sites around the world (Seabrook 1989, Hilmer et al. 2010). The limited nesting range of the honu has made the Hawaiian Islands population more vulnerable to habitat loss from increased stochastic events and sea level rise associated with climate change. The adult population in the main Hawaiian Islands is at risk from fisheries interactions, marine debris, and vessel strikes. Nearshore foraging habitat is also impacted by pollution and development. The main disease impacting Hawaiian honu is fibropapilloma which causes large tumors and is the main cause of strandings in the Hawaiian population (Work et al. 2015). The tumors can block vision, disrupt locomotion, disrupt organ function if they are internal, and impede breathing if they are located in the throat. The prevalence of the disease in turtles of the MHI appears to be associated with coastal pollution and invasive macroalgae (Van Houtan et al. 2010).

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7. PERSONAL COMMUNICATIONS

Tracy Anderson, 2016, SOS Coordinator, Kaua‘i Humane Society.

Don Heacock, 2012, Biologist, Division of Aquatic Resources, Kaua‘i.

Dr. Andre Raine, 2017, Manager, Kauai Endangered Seabird Recovery Project.
Appendix C. Social Attraction Benefit Estimator

MODEL TO ESTIMATE SOCIAL ATTRACTION SITE (SAS) BENEFIT TO THE NEWELL’S SHEARWATER (Puffinus auricularis newelli)

INTRODUCTION:

The Kaua’i Seabird Habitat Conservation Program (KSHCP) is an island-wide program to coordinate mitigation for permitted light attraction “take” of Newell’s Shearwater. The KSHCP aims to offset take and provide conservation benefit to this species by increasing productivity at breeding colonies. The primary mitigation strategy proposed for the KSHCP is to fund a predator-proof fence enclosure as a social attraction site, and the question arose as to how to determine the estimated benefit to seabirds from the selected project. KSHCP staff requested to work with Adam Vorsino (USFWS) directly on development of this social attraction site (SAS) estimator model. The KSHCP and USFWS have worked collaboratively to refine and improve the SAS estimator model.

In this document we describe the components of the SAS estimator model, and also the inputs that were used to assess mitigation benefit for a social attraction site at a selected location on the Kalalau Rim, on the north shore of Kaua’i. The Hawaiian name for this area of land is Kahuama’a, and thus this project is to be named the Kahuama’a Seabird Preserve. At this site, a predator proof fence will be installed, predators will be eradicated, native vegetation maintained and restored as needed, and social attraction for Newell’s Shearwater will be conducted over the 30 permit term of the KSHCP. The document describes how the model could be used to assess other locations as well.

MATERIALS AND METHODS

The basic premise of the SAS estimator model is to compare productivity of a “colony” of Newell’s Shearwaters within a predator proof enclosure to productivity outside of it (in a full predation scenario). The difference in production between the sites is the measure of benefit to the species from conducting the social attraction project. The model assumes that birds flying in could land and initiate breeding either within the fence, or in a simulated “parallel” site of the same size with no predator control. This model assumes that other threats to the population are not present (i.e. light attraction fallout and line collisions). This is based on the criteria of selecting a social attraction site located away from the threats of lights and lines so that maximum production can be achieved within the fenced area.

Some of the parameters are numerical inputs derived from various sources including project plans, literature citations, calculations from relevant data, and other supporting evidence. Details on these adjustable model parameters are described below, and summarized in Table 4. These parameters are designed for simple user input into R-studio, or other R-code program, allowing the user to make quick adjustments and run multiple model iterations, often necessary during the planning process.
Other important components of the SAS estimator model have been written into the R code by the program author (A. Vorsino, USFWS) and require edits to the model R code to adjust. Details on these set model parameters are also described below, and summarized in Table 5.

**ADJUSTABLE MODEL PARAMETERS**

**Fencing completion year/Start broadcasting year:**
**Description:**
This parameter defines the start of audio broadcasting to begin attracting Newell’s Shearwater. The model assumes that the project starts in Year 1, and the user determines what year the fencing and predator eradication will be complete, and what year you will begin broadcasting seabird calls to initiate social attraction to the site. The importance of delineating this parameter is that seabird benefit will not be derived until fencing, predator eradication and audio broadcasting is complete, so it is critical to identify a starting point.

**Input for KSHCP model:**
Fence completion and start of audio broadcasting will be by Year 2 of the KSHCP implementation. Year 1 of the project will consist of preparing the site, initiating fence construction, and working to remove predators from the site. Broadcasting of seabird calls will begin once predator eradication is complete, and we expect predators to be removed by the end of Year 1. For the KSHCP, we are assuming Year 0 is the time the model was run (2016), Year 1 is 2017 and Year 2 is 2018. The model is not specific to the month, and represents a calendar year, not directly tied to a seabird breeding season. Fortunately, a breeding season is typically encapsulated within a calendar year (March 15 April–December 15).

**Predation estimate:**
**Description:**
The predation scenarios used in the SAS estimator model to assess the Kahuama’a Seabird Preserve were created to specifically reflect estimated levels of predation for Newell’s Shearwater on the Island of Kaua’i. The predation scenarios define the baseline condition outside the fenced social attraction site. The predation scenarios used in this social attraction site model were derived from two primary data sources, KESRP monitoring data and Griesemer & Holmes (2011). Predation impacts are expressed in the model as changes to the species’ demographic life history parameters (see description in Set Model Parameters below).

Predation scenario 1 is based on analysis of KESRP data from colony monitoring 2011-2013 at several sites on the north shore of Kaua’i (Hono O Nā Pali, Upper Limahuli Preserve). KESRP estimated predation effects for 100 breeding pairs per specific predator. Total population is assumed to be a composite of egg/chick (year 0-1), sub-adult (year 2-5) and adult (year 6+). Using stable age distribution and reproductive probability, total number of eggs/chicks, sub-adults, and non-breeding adults was extrapolated from the breeding pair estimates, and predation effects for these age classes was defined. Any predation of a breeding adult would translate to loss of a chick as well, so chick predation rates reflect direct and indirect mortality.
This estimate needs to be updated with most recent data (2014-2016) to reflect more extensive sampling and predation effect.

Predation scenarios 2, 3 & 4 are based on Griesemer & Holmes (2011) predation estimates for low, medium and high effects. These estimates are mainly derived from data collected by Ainley et al. (2001) in the Kalāheo colony on the south shore of Kaua‘i.

**Input for KSHCP model:**
The model was run for predation scenarios 2, 3 & 4 described above, and results from each are presented below. Predation scenario 1 was not used in the assessment of the Kahuama‘a Seabird Preserve because the associated lambda (.988) was felt to be too high to accurately represent predation impacts to the metapopulation. This predation scenario could be adjusted and used for future model runs. Modifications should be made based on the most recent KESRP data and predation estimates.

**Flight path buffer:**
**Description:**
Flight paths are based on the USFWS population viability (PVA) model, which is being developed to evaluate all terrestrial threats to Newell’s Shearwaters, including risk of collisions with powerlines. To assess powerline collisions it is necessary to predict flight paths, in order to determine where birds are likely to intersect with powerlines during flight. The “least cost” flight path assessment is based on assumed colony locations (derived from KESRP auditory data) as the “source” and a series of 500 points (every 250 m²) along the coast as the “sink”. The two factors considered in defining the least cost path from source to sink are Topography and Coastal Access. The least cost pathway results from the shortest distance from colony to coast, with the least topographic “friction”. Variance in pathway results was accounted for using a weighted average. (For more detail on this analysis, see PVA Materials and Methods, USFWS, in prep). For the SAS estimator model, it is assumed that Newell’s Shearwater will use least cost flight paths, as derived from this USFWS PVA modeling data (USFWS, in prep).

Flight path buffer, in the context of SAS estimator model, refers to the overlap between audio broadcasting coverage and flight paths of prospective recruits to the site. The parameter is measured in distance (meters) from the fence that birds can be successfully recruited.

**Input for the KSHCP model:**
To determine our input value for this model parameter we explored various options to measure sphere of influence for audio broadcasting. One option was to estimate how far the broadcasting system could be heard by seabirds. This is based on the assumption that birds are transiting on their flight paths and will not deviate. The second (selected) option was based on localized topography. Given seabird circling patterns, and the exploratory nature of prospecting behavior (Brooke 2010, KESRP unpublished data), we assumed that all birds that entered the Kalalau Valley could come into auditory contact with our broadcasts. Thus we measured the maximum width of the Kalalau Valley (3000 meters) and used this as our input value.
Juvenile site fidelity:

Description:
This parameter determines what proportion of the birds whose flight path (+ buffer) intersects with the audio broadcasting will be available for recruitment to the social attraction site. The parameter applies to prospecting sub-adults, ages 2-5 years old. These are birds that are returning to Kaua‘i during the breeding season to prospect for nest sites and potential breeding partners (Ainley et al. 1995; Griesemer & Holmes 2011).

Site fidelity determines what portion of the prospecting sub-adults will “stray” from their natal colonies. This parameter is applied to birds from other colonies that may be available to recruit, and also birds born within the fenced site that will stray to other colonies when they return to Kaua‘i, though these two measures of site fidelity may be defined independently. Adults that establish nesting within the fenced site are assumed to have 100% site fidelity, and likewise, adults that have established nesting within other colonies are assumed to be unavailable for recruitment to the social attraction site. Seabird published literature supports this pattern of relatively higher rates of straying in juveniles, and high site fidelity for adult, breeding birds (Thibault 1993; Steiner & Gaston 2005; Robert et al. 2014).

Input for the KSHCP model:
To derive an estimate of juvenile site fidelity, we relied on research from other, similar species of shearwater. The most relevant study was on Cory’s shearwater (Calonectris borealis) off the coast of Spain, by Munilla et al. (2016). Here populations of Atlantic colonies were examined using microsatellite genetic markers to determine proportion of migrants within an established colony. Genetic assignment determined 5%, 10% and 30% migrants present in the three colonies reported on. In addition, genetic data for newly established colonies supported straying from multiple colonies throughout the study area, versus one large migration event.

The question of site fidelity to a colony requires defining the scale and spatial extent of a “colony”. There are multiple scales of fidelity that can be examined to explain patterns of nesting behavior. For example, likelihood of returning to Kaua‘i to breed, to the north shore of Kaua‘i, to the Kalalau Valley, and to specific breeding clusters (colonies) within the Kalalau Valley. Many studies of seabird nesting patterns describe site fidelity patterns by measuring number of meters of the natal burrow (Pyle et al. 2001; Steiner & Gaston 2005; Sugawa et al. 2014). In a study of streaked shearwaters (Calonectris leucomelas; Sugawa et al. 2014) straying is described as nesting within another breeding aggregate ~200 meters away. Thus, it seems appropriate to describe fidelity at the smallest scale, though we do not have genetic information for Newell’s Shearwaters to support these breeding patterns.

In the context of the proposed KSHCP social attraction site, we may be attracting birds from “colonies” anywhere within the Kalalau Valley. Though breeding colonies in the Kalalau Valley are within a relatively close proximity to one another, initiation of nesting within the fence enclosure (assuming there is no nesting currently) represents a colonization event in terms of island metapopulation dynamics (Matthiopoulos et al. 2005).
We used conservative estimates of juvenile site fidelity of 95%, 90% and 85% to represent a range of potential proportion of birds available for recruitment. These numbers can be tied to estimates of straying rates in the literature (Munilla et al. 2016), and assume that localized clusters of breeding represent “colonies”, or sub-populations, in terms of genetic or population structure. Currently we do not have genetic data for Newell’s Shearwater to determine differentiation at a colony scale, or even among islands. Literature for similar species suggests that the population substructure, natal philopatry, and breeding site fidelity is likely high.

The SAS model allows for differentiating site fidelity for recruitment as described above versus fidelity of birds born within the fence that may stray to other colonies. For the KSHCP model we assumed a higher, and more constant site fidelity for birds born within the fence. We set this parameter at 95% across all model runs. This was done to reflect assumed patterns of behavior as outside colonies are extirpated. For example, using Predation Scenario 4, the total island metapopulation of Newell’s Shearwaters outside the fence is 141 individuals by Year 50. Within the fence in this same scenario, the population at Year 50 is between 67-189 individuals, representing either a significant portion of the total population, or more birds within the fence than outside the fence. In this scenario, we assume that site fidelity to the social attraction site is high, as there are very few outside colonies with calling birds. Setting this site fidelity measure at 95% prevented the model from projecting a declining population within the fence as the outside population declines, reflecting the belief that this site could provide an extinction refugia.

**Run Time:**
**Description:**
This model parameter determines the number of years for which the population within the fence and outside of the fence is predicted. The standard run time set for the social attraction estimator model is 50 years.

**Input for the KSHCP model:**
The KSHCP model was run for the standard run time (50 Years), but cumulative fledgling productivity was calculated until Year 30, the proposed duration of the KSHCP.

**Burrow Capacity:**
**Description:**
Burrow capacity is determined by the amount of suitable habitat multiplied by the assumed burrow density. There may be separate inputs for natural burrow capacity versus artificial burrow density/capacity, if there are plans to install artificial burrows to increase productivity of social attraction.

Characterizing suitable habitat using large scale GIS-based metrics has been attempted by multiple researchers. The USFWS Ecological Niche Model (ENM) found the strongest correlation for Newell’s Shearwater habitat to five variables: isothermality, precipitation seasonality, slope, topographical roughness and wind speed at 50 meters (USFWS, in prep). Troy et al. (2014) found the best predictive variables in determining suitable habitat for Newell’s Shearwater
nesting to be slope, native vegetation, and soil/rock composition. Borelle et al. (2015) modeled habitat suitability for multiple burrow nesting shearwaters and petrels, and found vegetation, soil quality, induration and slope to be the most relevant for determining suitability.

The multiple factors used to predict suitable nesting habitat can be analyzed remotely using GIS, or data can be collected in the field to identify or verify suitable habitat classifications. Relying on GIS layers assumes these data are reliable at a localized, site-specific scale. In some cases, it may be more appropriate to collect data on site.

The habitat suitability parameter for the SAS estimator model is a simplified adaptation of the modeling efforts described above. Vegetation, soil quality and other predictive factors are assumed to be sufficient based on field visits to the site. Slope is the main variable with multiple input options. Slope data collected at burrow sites by KESRP technicians was sorted into Minimum, First Quartile, Median, Third Quartile and Maximum (KESRP, unpublished data). The resulting slopes for this are presented in Table 1. A digital elevation model (DEM) raster, with a resolution of 30 meters or greater, is analyzed for each model run, and the selected range of slopes is applied to the social attraction site to delineate suitable habitat. For example, if 1st Quartile is selected, all terrain with a slope of 14.9% or greater is included in the suitable habitat estimate.

Table 1: KESRP burrow data and associated slope occupancy range.

<table>
<thead>
<tr>
<th>Associated Slope (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum</td>
</tr>
<tr>
<td>1st Quartile</td>
</tr>
<tr>
<td>Median</td>
</tr>
<tr>
<td>3rd Quartile</td>
</tr>
<tr>
<td>Maximum</td>
</tr>
</tbody>
</table>

Burrow density must also be defined for the site to determine site burrow capacity, using available data and supporting literature.

The model provides two options for inputting burrow capacity:

1. Provide a burrow density estimate, slope occupancy range and a DEM raster for the proposed social attraction site. Suitable habitat hectares and total site burrow capacity will be calculated.
2. Provide a site-specific burrow capacity, calculated from other sources.

Input for the KSHCP model:

Due to the small size of the Kahuamaʻa Seabird Preserve, we chose to estimate hectares of suitable habitat from field measurements versus relying on GIS data layers. We determined that all of the fenceable area (1.2 ha) was suitable, given condition of soil, slope and presence of native vegetation.
There is unpublished data on burrow densities within managed colonies of Newell’s Shearwaters on Kaua‘i (Andre Raine, pers comm). However, these colonies are subject to predation and are presumed to be greatly diminished from former densities. Instead, we relied on Manx shearwater (Puffinus puffinus) burrow densities from inland colonies in Wales, where the largest colony in the world is present (Smith et al. 2001). We selected only densities from inland colonies (versus coastal) as these are more likely to represent nesting conditions for the inland-breeding Newell’s Shearwater. Two colony densities were presented: 0.070 burrows per meter squared, and 0.046/m². The average of these two colony densities is 0.058, which was used to calculate total burrow capacity for the KSHCP site.

The KSHCP proposes to install 100 artificial burrows within the fenced social attraction site. These burrows are in addition to the overall burrow capacity for natural burrows. Installation of artificial burrows can expedite the process of establishing breeding at a new site because burrow excavation by a newly established breeding pair can take a year or more (Bancroft et al. 2004). Artificial burrows are also easier to monitor.

Thus the total burrow capacity for the site is 796 burrows (Table 2).

**Table 2:** Calculating burrow capacity for the KSHCP model.

<table>
<thead>
<tr>
<th>Model parameter</th>
<th>Calculation</th>
<th>Input for KSHCP model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burrow Capacity</td>
<td>[Total hectares suitable habitat * estimated natural burrow density] + proposed number of artificial burrows to be installed</td>
<td>1.2 ha * 0.058 burrows/m² = 696 + 100 (artificial burrows) = 796 (Total burrow capacity at site)</td>
</tr>
</tbody>
</table>

**Starting metapopulation size:**

**Description:**

The population size for all Newell’s Shearwaters on Kaua‘i (metapopulation) is a critical model input as this defines number of birds that are available for recruitment into the social attraction site. The most recent and widely used population estimate is from Joyce (2013), an at-sea estimate using data from 1998-2011. The total Newell’s Shearwater median population size was estimated at 27,011 individuals. An estimated 90% of the total population (Griesemer & Holmes 2011; Spear et al. 1995) nests on the island of Kaua‘i, thus the total metapopulation size for Kaua‘i would be 24,310 birds. However, since the social attraction estimator model relies on known colonies to model recruitment, we must exclude potential colonies on lands that are inaccessible for surveys. This represents ~21% of the total population, and reduces the potential metapopulation for modeled for recruitment to 19,691 birds. This effectively reduces the number of birds available for recruitment by 21%, and thus the production estimates should be considered an underestimate, since in reality birds from these inaccessible colonies are still available, they are just not part of the model estimates.
The Newell’s Shearwater population is experiencing a precipitous decline annually, and we felt it was inappropriate to assume that this did not further reduce the metapopulation size in the period from sampling to 2016 (year of model run). Since the sampling was conducted over a 14 year period, we assigned the median data estimate (27,011) to 2006, the median sampling for the Hawaiʻi portion of the dataset (T. Joyce, pers comm, 2016). Thus the expected decline, associated with the various predation scenarios, was used to estimate a starting metapopulation size for Year 1 (Table 3). As mentioned above, line collision and light attraction fallout mortality is not part of this modeled decline, so these numbers likely represent an overly optimistic metapopulation number for 2016.

**Table 3: Calculating starting metapopulation size for Newell’s Shearwater on Kauaʻi.**

<table>
<thead>
<tr>
<th>Model parameter</th>
<th>Calculation</th>
<th>Input for KSHCP model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Starting metapopulation size</td>
<td>[Joyce 2011 at-sea population estimates * .90 (% of total pop that is on Kauaʻi) * .80 (% of total Kauaʻi pop that is represented in flight path estimates)] – Estimated decline between 2006-2016</td>
<td>Year 1 Starting Metapopulation: Predation Scenario 2: 14,976 Predation Scenario 3: 11,184 Predation Scenario 4: 8647</td>
</tr>
</tbody>
</table>

**Input for the KSHCP model:**
The model was run for each of the starting metapopulations from Table 3.

Table 4 is a summary of the inputs for the social attraction estimator model described in detail above.

**Table 4: Summary of all input parameters for the KSHCP model.**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Input used for KSHCP model</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fencing completion year</td>
<td>Year 2</td>
<td>Conservative estimate based on prep required</td>
</tr>
<tr>
<td>Start broadcasting year</td>
<td>Year 2</td>
<td>Conservative estimate based on prep required</td>
</tr>
</tbody>
</table>
| Predation estimate             | All scenarios were run     | **Scenario 2** = Griesemer & Holmes (2011) low predation  
**Scenario 3** = Griesemer & Holmes (2011) medium predation  
**Scenario 4** = Griesemer & Holmes (2011) high predation |
| Flight path buffer             | 3000 m                     | Distance from fence whereby prospecting birds may be attracted                            |
## SET MODEL PARAMETERS

The **adjustable model parameters** described above are run using the framework of an underlying deterministic population viability analysis (PVA) with set model parameters (Table 5). This PVA relies on life history components developed via previous work, specifically Ainley et al. (2001), and Griesemer & Holmes (2011).

The methodology is described in detail in the USFWS PVA modeling (in prep) but the basic modeling strategy is the use of a Leslie matrix to compile fecundity and survivorship for each age class to estimate population growth rates (lambda). The three age classes used are egg/chick (year 0-1), sub-adult (year 2-5) and adult (year 6+). The model estimates a lambda in the absence of predation, line collisions, light attraction fallout, and any other threats to the population. Then mortality rates associated with each of these threats are applied to reduce the lambda accordingly.

It is important to note that for the model analysis of the Kahuama’a Seabird Preserve, meta-population line collisions and light attraction were assumed to be zero, as the likely flight path to the coast, and the colony itself, are assumed to be unaffected by these anthropogenic mortality factors (at and around this site). Because this colony is situated in an area on Kaua’i that likely does not have these mortality events, populations with sub-adults that could be
recruited into this preserve would also likely be unaffected by these elements. The lambda used to define the growth of the population (as applied to the overall meta-population) reflects this geographic difference, as such the predicted meta-population size is not a realistic estimate, but a bi-product of the modeling exercise for this specific site. It is well-known that these mortality factors have a large affect elsewhere in the meta-population. This is addressed thoroughly in the Fish and Wildlife Site by Site PVA.

Table 5: Set model parameters for KSHCP social attraction estimator model.

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>NOTES</th>
<th>MODEL INPUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breeding probability</td>
<td>Estimated from the average of 15 data sets for Newell’s Shearwater and proxy species (Griesemer &amp; Holmes 2011).</td>
<td>0.88</td>
</tr>
<tr>
<td>Reproductive success</td>
<td>Estimated from the average of 38 data sets for proxy species (Griesemer &amp; Holmes 2011)</td>
<td>Within fence = 0.81</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Outside of fence = 0.35-0.52 (varies with predation scenario)</td>
</tr>
<tr>
<td>Age of first reproduction</td>
<td>Griesemer &amp; Holmes 2011</td>
<td>6 years old</td>
</tr>
<tr>
<td>Age of last reproduction</td>
<td>Ainley et al. 2001</td>
<td>36 years old</td>
</tr>
<tr>
<td>Survivorship per age class</td>
<td>Griesemer &amp; Holmes 2011</td>
<td>Year 0-1: 0.654</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Year 1-2: 0.78</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Year 2-3: 0.89</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Years 3-5: 0.905</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Year 6+: 0.92</td>
</tr>
</tbody>
</table>

RESULTS

Data that are available from the model output include:

- Number of birds in each age class for the population within the fence enclosure in any given year of time (0-50 years)
- Number of birds in each age class for a parallel population outside of the fence enclosure in any given year of time (0-50 years)
- Population lambda (within fence enclosure and outside fence enclosure)
- Total population size at Year 50 (within fence enclosure)

Table 6 presents results of population size within and outside the fence in 50 years. This is total number of individuals present, including all age classes. The population number for outside the fence represents the total metapopulation of Newell’s Shearwaters on Kaua‘i. The estimated number of birds in 50 years ranges from 141-3811 individuals. Within the fence there is a positive growth rate (lambda >1.0) and thus this population goes from the initial starting point of zero to a range of 63-877 birds over the 50 year time period. The “within fence” population is directly correlated to population numbers outside of the fence because the model assumes
continuous recruitment through the 50 year time frame. When less birds are available for recruitment, population within the fence does not grow as quickly. Final population estimate within the fence assumes social attraction calls are broadcast for the life of the project, and that birds added each year are both new prospectors and returning prospectors/breeders.

The population outside of the fence experiences a negative growth rate in all predation scenarios, with a lambda ranging from 0.921-0.973. In the most optimistic predation scenario (2), the population declines from a starting metapopulation size of 14,976 (see Table 3) to 3811. However, in the most drastic predation scenario (4), the total metapopulation for Kaua’i declines from from 8,647 individuals in 2016, to 141 individuals in 50 years, almost identical to the population within the 1.2 hectare fence enclosure (63-189 birds).

Table 6: Population size at 50 years within the fence and outside the fence, comparing various predation scenarios and site fidelities.

<table>
<thead>
<tr>
<th>Predation Scenario:</th>
<th>Population Lambda</th>
<th>85% Site Fidelity</th>
<th>90% Site Fidelity</th>
<th>95% Site Fidelity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Within fence 2</td>
<td>1.08</td>
<td>877</td>
<td>534</td>
<td>292</td>
</tr>
<tr>
<td>Outside fence 2</td>
<td>0.973</td>
<td>3811</td>
<td>3811</td>
<td>3811</td>
</tr>
<tr>
<td>Within fence 3</td>
<td>1.08</td>
<td>372</td>
<td>248</td>
<td>124</td>
</tr>
<tr>
<td>Outside fence 3</td>
<td>0.945</td>
<td>661</td>
<td>661</td>
<td>661</td>
</tr>
<tr>
<td>Within fence 4</td>
<td>1.08</td>
<td>189</td>
<td>126</td>
<td>63</td>
</tr>
<tr>
<td>Outside fence 4</td>
<td>0.921</td>
<td>141</td>
<td>141</td>
<td>141</td>
</tr>
</tbody>
</table>
The primary result of interest for the KSHCP social attraction site is a comparison of the cumulative number of fledglings produced within the predator proof fence enclosure and outside the fence. Fledglings produced are the “currency” by which permitted take in the HCP is offset and mitigated. Table 7 presents the comparison of fledglings produced in the predator free fence area versus how many would have been produced in a similar area (in size, terrain, slope etc.) outside of fence. Unlike Table 6, where outside the fence represents total Kaua’i metapopulation, the results presented in Table 7 represent the production in a similar area outside the fence only. Though model outputs are for 50 years, the anticipated KSHCP permit term is 30 years, so the results for the first 30 years were extracted from the total.

**Table 7:** Number of fledglings produced in 30 years within fence enclosure and outside fence enclosure, comparing various site fidelities and predation scenarios.

<table>
<thead>
<tr>
<th>Predation Scenario:</th>
<th>85% Site Fidelity</th>
<th>90% Site Fidelity</th>
<th>95% Site Fidelity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Within fence</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>1,385</td>
<td>923</td>
<td>462</td>
</tr>
<tr>
<td>Outside fence</td>
<td>2</td>
<td>340</td>
<td>226</td>
</tr>
<tr>
<td><strong>DIFFERENCE:</strong></td>
<td>1,045</td>
<td>697</td>
<td>348</td>
</tr>
<tr>
<td>Within fence</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>762</td>
<td>508</td>
<td>254</td>
</tr>
<tr>
<td>Outside fence</td>
<td>3</td>
<td>131</td>
<td>87</td>
</tr>
<tr>
<td><strong>DIFFERENCE:</strong></td>
<td>631</td>
<td>421</td>
<td>210</td>
</tr>
<tr>
<td>Within fence</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>457</td>
<td>304</td>
<td>152</td>
</tr>
<tr>
<td>Outside fence</td>
<td>4</td>
<td>58</td>
<td>38</td>
</tr>
<tr>
<td><strong>DIFFERENCE:</strong></td>
<td>399</td>
<td>266</td>
<td>133</td>
</tr>
</tbody>
</table>

The cumulative number of fledglings produced within the fence varies greatly by site fidelity rates. As more birds are available for recruitment into the site, cumulative fledgling production increases. These model results show that maximum fledgling production is achieved when 15% of the birds whose flight path come within 3000 meters of the site are available for recruitment, and the total metapopulation is declining less steeply.

The cumulative number of fledglings produced within the fence during the 30 year permit term does not vary based on modeled burrow capacity scenarios (Table 8). To look at the effect of expanding fence size or over-estimating burrow density, we ran several burrow capacity scenarios, using fixed predation scenario and site fidelity inputs and assuming all other model...
parameters are stable. The results demonstrate the overall slow production rates of this seabird species. Fledgling production over 30 years does not reach, and therefore is not limited by, site burrow capacity. Similarly, total “within fence” population size at 50 years does not reach carrying capacity in any of the modeled scenarios.

Table 8: Comparison of 30 year cumulative fledgling production with various burrow capacity assumptions.

<table>
<thead>
<tr>
<th>Modeled burrow capacity scenarios</th>
<th>Within fence total burrow capacity</th>
<th>Number of fledglings produced in 30 years within the fence (Predation scenario 2; Site fidelity 85%)</th>
<th>Within fence population size at 50 years (total individuals)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimated burrow capacity for 1.2 ha KSHCP site (see Table 2)</td>
<td>796</td>
<td>1,045</td>
<td>877</td>
</tr>
<tr>
<td>Estimated burrow capacity for an expanded site (in same location) of 2.15 ha (0.058 burrows/m²)</td>
<td>1,253</td>
<td>1,045</td>
<td>877</td>
</tr>
<tr>
<td>Estimated burrow capacity for 1.2 ha KSHCP site if burrow density was half (0.026 vs 0.058)</td>
<td>400</td>
<td>1,045</td>
<td>877</td>
</tr>
</tbody>
</table>

**DISCUSSION**

The main goal of this modeling exercise is to determine whether the selected mitigation option (predator proof fence enclosure and seabird social attraction site on the Kalalau rim) is likely to sufficiently offset the anticipated take request of Newell’s Shearwater fledglings in the KSHCP. It is valid to look at a range of results, to account for uncertainty in selected model inputs for each parameter.

For example, with the predation scenarios, the most drastic scenarios (3 & 4) result in a total Kaua‘i metapopulation of <1000 birds by the end of 50 years (see Table 6). Scenario 2 is an intermediate decline (total metapopulation of 3,811 birds in 50 years). For comparison, the USFWS NESH Landscape Strategy (USFWS 2016) presents a projected population estimate at the end of 30 years to be 148-4,452 birds.

However, neither of these population projections takes into account large-scale conservation projects that may slow decline and aid recovery. Large-scale mitigation work implemented as
part of the KIUC long term HCP, Kaua’i Watershed Alliance management plan, DOFAW’s Native Ecosystem Protection and Management Program (NEPM) and others is expected to occur concurrently with the KSHCP social attraction site. These efforts are likely to contribute to increased productivity within Newell’s Shearwater breeding colonies. This would result in less drastic decline to the metapopulation, and also increased recruitment and growth within the social attraction site.

Conversely, these population estimates do not take into account threats at-sea, such as changes in prey base due to climate change, fishing lines or overfishing, etc. Given the layers of uncertainty on impacts of predation, lights, line collisions and at-sea threats, effect of colony protection efforts, and even uncertainty about starting metapopulation estimates, presenting a range of possible outcomes for the social attraction site is prudent.

One important result of the social attraction estimator model that is worth discussion is the fact that the most influential parameters in the model are aspects of the program that cannot be managed. For example, the most logical way to adaptively manage the mitigation project to create more fledgling production would be to increase the size of the fence enclosure. In the long term (50+ years), this will result in more production, assuming social attraction is successful and maximum burrow densities are realized. However, within the 30-50 year period modeled, increasing the fence size does not positively influence cumulative production of fledglings. This is due to slow growth rates for seabirds and long generation time.

Instead, maximum production in the modeling is heavily influenced by juvenile site fidelity, predation estimates outside of the fence, and flight path buffer. Juvenile site fidelity is optimized when it allows for successful recruitment of birds and yet enough natal site fidelity from birds born within the fenced area. Predation estimates are optimized when there is an assumption of large-scale conservation efforts altering current patterns of steep population decline. Recruitment is determined by sufficient intersection of assumed flight paths. Future data may inform our estimates on these parameters, but we are not able to manage populations to increase them.

One exception to this is in comparing site locations. Since the model is actively linked to GIS data on site location and corresponding seabird flight paths, certain areas of the island will have a higher overlap with presumed flight paths, and thus will have more birds available for recruitment. This could have useful management implications when deciding on future social attraction site locations.

Through the duration of the KSHCP social attraction project, biological monitoring will be key for validating or updating model assumptions. Data will be collected on auditory seabird activity at the site, occupied burrows, fledglings produced etc. Off-site monitoring data collected by other entities (KESRP, USFWS, USGS, NARS etc.) on metapopulation trends, effectiveness of predator control and other large-scale conservation efforts, and on impacts of other threats will be incorporated as well.
# SOCIAL ATTRACTION SITE ESTIMATOR FOR A SITE WITH A STANDING POPULATION#

rm(list = ls())

# For further information about this calculator please contact the author at:
#
# Adam E. Vorsino, Ph.D.
# Strategic Habitat Conservation Division
# Pacific Island Fish and Wildlife Office
# 300 Ala Moana Blvd. Ste. 3-122
# adam_vorsino@fws.gov
# (808)792-9431
#

# Disclaimer: This calculator was developed for the Kauai Seabird Habitat
# Conservation Program. The information used to develop this assessment is specific
# to Newell’s shearwater and so should not be used to assess social attraction at
# sites that are not suitable for this species. The population and flight path
# overlap information is up-to-date as of 3/7/2016. Please use and review the
# input and output carefully. If used to assess the utility of a site for social
# attraction, the user of this tool is solely responsible for the input and output
# of the assessment. This calculator is provided as technical assistance and does
# not represent Service policy. It should be used only if it constitutes the best
# available scientific information on a case-by-case basis.

# META-POPULATION SIZE (TO ASSESS SUB-ADULT FLYOVER)
# 27011*0.9 uses Trevor Joice Estimate multiplied by 0.9 (for Kauai Meta-pop)
# and multiplied by 0.81 to estimate the amount of population explained by the
# KESRP colony polygons. These numbers will be modified using the selected
# predation estimate to reflect the current meta-population
MetaPopSize <- 27011*0.9#UserSpecified#

# The year that the data used to define the meta-population size was obtained.
# From this a current estimate of the meta-population (without light or strike
# impact)is derived by applying the predation estimate to all years between then,
# and the current year. The current year is defined by the computer and uses the
# year in which the calculator was run. A Year must be defined.
YearPopEstimated <- 2006#UserSpecified# 2011

# STARTING POPULATION SIZE OF THE ASSESSED SITE
# This metric is meant to inform the population growth at a site with a standing
# population while social attraction is also being conducted at that site. If
# SPS is 0 the calculator will develop an assessment that only defines a Social
# Attraction Site. Please note, this is meant to be an estimate of the Total
# Population Size at the site, not just adults or burrows.
SPS <-0#UserSpecified#

# FENCE EFFICACY
# Can use this section to assess either “leaky fence” or specific fence type
# scenarios, values range from 0 to 1, where 1 is complete control, and 0 is
# no control.
Ungulate_Cntrl <- 1
Rat_Cntrl <- 1
Cat_Cntrl <- 1
BrOwl_Cntrl <- 1

# FENCING COMPLETION YEAR
Fence_Fin <- 2

# START OF SOCIAL ATTRACTION SITE BROADCASTING YEAR
Broad_Strt <- 2

# BURROW CAPACITY OF SOCIAL ATTRACTION SITE
# Define the number of burrows in the location specified (either artificial or naturaly produced)
# If unknown use the SLOPE OF OCCUPANCY FOR BURROW CAPACITY and put "None"
Burrow_Cap <- "None"#796

# SLOPE OF OCCUPANCY FOR BURROW CAPACITY
# If burrow capacity is not given (i.e. it is set to "none") then the code will use various slopes defined by burrow collections (as collected by KESRP) to estimate the area that can be used by NESH. Can use 'min', '1stQ', 'median', '3rdQ', and 'max') these are minimum, first quartile, median, third quartile, and maximum.
# If using a DEM with a resolution of 30m or greater the burrow slope estimates were approximated at a 30m slope. If using a higher resolution DEM the burrow slope estimates collected at the burrow will be used. If not in use please put 'None'
Slope_Of_Occupancy <- '3rdQ'

#NUMBER OF BURROWS PER METER SQUARED
# only specify if using 'Slope_Of_Occupancy' to define burrow occupancy for a site otherwise specify 'None'
Num_Per_Meter <- 0.037

# PREDATION ESTIMATE
# Can use 1, 2, 3 or 4 this corresponds to the KSHCP predation estimate (1), and Greissemer and Holmes (2011) low (2) and medium (3) and high (4) predation estimates respectively. It is a good practice to look at all four...
PredationEst <- 3

# RUN TIME OF CALCULATOR (IN YEARS),
# Run for > or = 50 years for best results
RunTme <- 32

# BUFFER AREA AROUND THE SOCIAL ATTRACTION SITE FROM WHICH BIRDS WILL BE CALLED
# DO NOT CHANGE UNLESS THE OPTIONAL AREA (BELOW) HAS ALL OF THE SPECIFIED INFORMATION IN IT
# Buffer should be in meters. It represents the distance from the fenceline that the calling units are effective
ExclusBuffer <- 3000

# SITE FIDELITY OF JUVENILES (SUB ADULTS)
# constant is used to derive an estimate of attraction to a newly enclosed site (SitFidIn)
# or the natal population (SitFidOut)a value of 0.95 indicates that juveniles/sub-adults
# have a 95% probability of returning to there breeding area. Make sure the value is
# greater than 0 and less than or equal to 1
SitFidIn <- 0.85#UserSpecified#
SitFidOut <- 0.85#UserSpecified#

#Put Desktop Computer User Name here or (if not a federal computer or other
# that needs admin privileges) use "Public"
DCN <- 'avorsino'#UserName#

# PUT THE FILE NAME !!!!!CONTAINING!!!! THE SOCIAL ATTRACTION SITE SHAPEFILE
# please make sure this is in quotes and forward slashes are used Instead of
# backslashes (see example).
# On my computer (Adam Vorsino) this Looks like:
#J:/PIOGIS12/APPS/SH_CC/Adam/KSHCP Social Attraction Site#
# If no file is specified please put "None"#
SASiteFile <- "J:/PIOGIS12/APPS/SH_CC/Adam/KSHCP Social Attraction Site"#None"

# PUT THE NAME OF THE SHAPEFILE TO USE IN THE ANALYSIS (THAT WHICH SASiteFile IS
# LEADING TO)
# If no file is specified please put "None"
ShapeName <- "Exocarpos_SAS"#"None"#UserSpecified## "Exocarpos_SAS"#"None"#

# PUT THE RASTER LOCATION CONTAINING THE FLIGHT PATH ESTIMATES FOR THE AREA
# please make sure this is in quotes and forward slashes are used Instead of
# backslashes (see example).
# On my computer (Adam Vorsino) this Looks like:
# J:/PIOGIS12/APPS/SH_CC/Adam/NESH_Analysis/Andre_LCP_AroundIsle/NESH_WeightedAvg_For
# Ka.tif
# If no file is specified please put "None"
FlightPath <- "J:/PIOGIS12/APPS/SH_CC/Adam/NESH_Analysis/Andre_LCP_AroundIsle/NESH_WeigthedAvg_ForKa.tif"#None"#UserSpecified# 

# PUT THE RASTER LOCATION CONTAINING THE ELEVATION PROFILE (DIGITAL ELEVATION MODEL)
# please make sure this is in quotes and forward slashes are used Instead of
# backslashes (see example)
# on my computer (Adam Vorsino) this Looks like:
# J:/PIOGIS12/APPS/SH_CC/Adam/NESH_Analysis/Andre_LCP_AroundIsle/ka_DEM.tif
# It is recomended to use a DEM with a resolution of 30m or less.
# If no file is specified please put "None"
DEM <- 'J:/PIOGIS12/APPS/SH_CC/Adam/NESH_Analysis/Andre_LCP_AroundIsle/ka_DEM.tif'"None"#UserSpecified# 

APPENDIX C  Draft Kauai Seabird Habitat Conservation Plan  17
# TESTING FOR ERRORS OR LACK OF INFORMATION

```r
etest1 <- cbind(MetaPopSize, Fence_Fin, Broad_Strt, Burrow_Cap, RunTme)
etest1A <- apply(ertest1, 2, function(x) {length(unique(x))})

ErrMsg <- c('META-POPULATION SIZE THAT HAS POTENTIAL FOR RECRUITMENT INTO THE SITE ',
             'YEAR IN WHICH THE FENCE FOR THE SOCIAL ATTRACTION SITE IS TO BE COMPLETED',
             'YEAR IN WHICH THE SOCIAL ATTRACTION BROADCASTING STARTS',
             'BURROW CAPACITY OF THE SOCIAL ATTRACTION SITE',
             'THE NUMBER OF YEARS THE ANALYSIS RUNS FOR')

if(TRUE %in% c(unique(ertest1A) != c(1, 1, 1, 1, 1))){
  Msg1 <- ErrMessages[which((ertest1A != c(1, 1, 1, 1, 1)) == T)]
  cat(paste0(" !PLEASE PUT A SINGLE VALUE DESCRIBING THE ", Msg1, " ! ")
}
try(stop(), T)
else{
  if(length(which(((c(1,2,3,4) %in% PredationEst) == T)) == 1){
    cat(" !PLEASE PUT A SINGLE VALUE (1,2 or 3) DESCRIBING PREDATION ESTIMATE TO BE USED! ")
  }
  try(stop(), T)
  else{
    if(SitFidIn > 1){
      cat(" !PLEASE PUT A SINGLE VALUE (LESS THAN OR EQUAL TO 1) DESCRIBING THE SITE FIDELITY OF JUVENILE (PRE-BREEDING) SEABIRDS! ")
      try(stop(), T)
    }
    else{
      if(SitFidIn <= 0){
        cat(" !PLEASE PUT A SINGLE VALUE (GREATER THAN 0) DESCRIBING THE SITE FIDELITY OF JUVENILE (PRE-BREEDING) SEABIRDS! ")
        try(stop(), T)
      }
      else{
        Dir <- paste0("C:/Users/", DCN, 
                
                '/Desktop/KIUC_SPS-SA_FenceYr_-', Fence_Fin, '_CallYr_', Broad_Strt, '_RunTime_ ', RunTme, 
                
                '/")
        if(file.exists(Dir) == F){
          dir.create(Dir)
        }
        if(is.na(installed.packages()['Package']["popbio"])) == T{
          install.packages("popbio", dependencies = T)
        }
        if(is.na(installed.packages()['Package']["stringr"])) == T{
          install.packages("stringr", dependencies = T)
        }
        if(is.na(installed.packages()['Package']["raster"])) == T{
          install.packages("raster", dependencies = T)
        }
        if(is.na(installed.packages()['Package']["rgdal"])) == T{
          install.packages("rgdal", dependencies = T)
        }
      }
    }
  }
}
```
```r
if ((is.na(installed.packages())[,"Package"]["rgeos"])==T){
  install.packages("rgeos", dependencies = T)
}
library(rgdal)
library(raster)
library(rgeos)
library(stringr)
library(popbio)

if(ExclusBuffer>0){
  ##########Defining carrying capacity for Social Attraction Sites###########
  if(unique(file.exists(SASiteFile, FlightPath))==T){
    WgtAvg_FP<-raster(FlightPath)/cellStats(raster(FlightPath), stat = 'sum')
    coordSys <- '+proj=longlat +datum=WGS84 +no_defs +ellps=WGS84 +towgs84=0,
    0,0'
    utmSys<"+proj=utm +zone=4 +ellps=WGS84"
    KSHCP_AAS<-readOGR(SASiteFile, ShapeName)
    KSHCP_AAS_WGS<-spTransform(KSHCP_AAS, coordSys)
    KSHCP_AAS_UTM<-spTransform(KSHCP_AAS_WGS, utmSys)
    KSHCP_AAS_UTMBuff<-gBuffer(KSHCP_AAS_UTM, byid = T, width = ExclusBuffer)
    Overlap<-sum(unlist(raster:::extract(WgtAvg_FP, KSHCP_AAS_UTMBuff)), na.rm = T)
  }else{
    cat("       !IF A BUFFER GREATER THAN 0 IS USED THE FLIGHT PATH RASTER AN
    D SOCIAL ATTRACTION SITE SHAPEFILE LOCATION (AND NAME)
    MUST BE SPECIFIED IN THE OPTIONAL SECTION ABOVE!         ")
  }
}else{
  if(unique(file.exists(SASiteFile, FlightPath))==T){
    WgtAvg_FP<-raster(FlightPath)/cellStats(raster(FlightPath), stat = 'sum')
    coordSys <- '+proj=longlat +datum=WGS84 +no_defs +ellps=WGS84 +towgs84=0,
    0,0'
    utmSys<"+proj=utm +zone=4 +ellps=WGS84"
    KSHCP_AAS<-readOGR(SASiteFile, ShapeName)
    KSHCP_AAS_WGS<-spTransform(KSHCP_AAS, coordSys)
    KSHCP_AAS_UTM<-spTransform(KSHCP_AAS_WGS, utmSys)
    # KSHCP_AAS_UTMBuff<-gBuffer(KSHCP_AAS_UTM, byid = T, width = ExclusBuffer)
    Overlap<-sum(unlist(raster:::extract(WgtAvg_FP, KSHCP_AAS_UTM)), na.rm = T)
  }else{
    Overlap<-0.14
  }
} cat('\n Flight Path Overlap Value Used = ', Overlap)
```
if(Burrow_Cap == 'None') {
    if((DEM != 'None') == T) {

        DEMRas <- raster(DEM)
        DEMRas_UTM <- projectRaster(DEMRas, crs = utmSys)

        SiteSlope <- raster:::extract(terrain(DEMRas_UTM, opt = 'slope', unit = 'degrees'), KSHCP_AAS_UTM)
        SofORange <- c('min', '1stQ', 'median', '3rdQ', 'max')

        resRas <- res(DEMRas_UTM)[1]
        if(resRas >= 30) {
            SofONum <- c(0.62, 14.93, 21.64, 29.94, 45) # burrow slopes derived from 30m DEM
        } else {
            SofONum <- c(5, 30, 45, 65, 90)
        }

        SofO1 <- SofONum[which(SofORange == Slope_Of_Occupancy)]

        NumBurrows <- (length(SiteSlope[which(SiteSlope[[1]] >= SofO1)]) * (resRas^2)) * Num_Per_Meter
        Burrow_Cap <- NumBurrows
    } else {
        cat("       !IF NO BURROW CAPACITY IS SPECIFIED A 'Slope_Of_Occupancy' AN D 'DEM' FILE MUST BE SPECIFIED!       ")
    } else {
        Burrow_Cap <- Burrow_Cap
    }

    cat('\n Burrow Capacity of Site = ', Burrow_Cap)

########################################################
##########MAKEING THE LIFE TABLE AND PROJECTION MATRIX USING Qx AND Px##########
########################################################

# Defined from Breeding Success and Reproductive Success of Procelariforms (with not preda
tion) to get Standard Deviations

# Calculation of Breeding Probability from G\&H 2011 and KESRP 2013 data
BrProb <- c(0.87, 0.90, 0.80, 0.72, 0.81, 0.75, 0.83, 0.95, 0.89, 0.90, 0.86, 0.80, 0.74, 0.83, 0.69)

# Calculation of Reproductive Success from G\&H 2011 (no predators present (<= #11) or eradicated (> #11))
ReproSucc <- c(0.52, 0.51, 0.63, 0.35, 0.76, 0.61, 0.52, 0.58, 0.70, 0.62, 0.61}
$NESH_{age}$< 36 # age of oldest probable NESH
$NESH_{first\_rep}$< 6 # age reproduction occurs for NESH
$Age$< $c(0, \ seq(1, \ NESH_{age}, \ 1))$

L$x$< $c(1)$
for (ti in 1:NESH$_{age}$){
  if (ti == 1){
    L$x$<-cbind(L$x$, L$x$*0.654)
  } 
  if (ti == 2){
    L$x$<-cbind(L$x$, L$x$[length(L$x$)]*0.78)
  } 
  if (ti == 3){
    L$x$<-cbind(L$x$, L$x$[length(L$x$)]*0.89)
  } 
  if (ti == 4){
    L$x$<-cbind(L$x$, L$x$[length(L$x$)]*0.905)
  } 
  if (ti == 5){
    L$x$<-cbind(L$x$, L$x$[length(L$x$)]*0.905)
  } 
  if (ti == 6){
    L$x$<-cbind(L$x$, L$x$[length(L$x$)]*0.905)
  } 
  if (ti > 6){
    L$x$<-cbind(L$x$, L$x$[length(L$x$)]*0.92)
  }
}
L$x$<-as.numeric(as.character(L$x$))

# Used these estimates for reproductive success without predators because the average found for NESH with some level of control was
# 0.88 NESH repro prob, and 0.75 NESH repro. success (max = 0.95 and 0.81 respectively). For an area with some level of control (Upper limahule) repro. succes
wa
# at 0.902439 and repro. prob was 0.7837838. Given that ULP has ungulate fen
ceing and predator control (not exclusion), it is
# definitive that these numbers are probably even higher for an area with pre
dator exclusion, as such these numbers were selected

Ex$_{JuviSuccess}$$\leftarrow$$\text{boxplot}(\text{ReproSuccess}, \ \text{plot=}{F})$$\text{stats}[5,]## the upper whisker of reproductive success (=0.81)
Ex$_{ReproProb}$$\leftarrow$$\text{boxplot}(\text{BrProb}, \ \text{plot=}{F})$$\text{stats}[4,]## the 3rd Quantile of breeding probability (=0.88)

M$x$< $c(\ rep(0, \ (NESH_{first\_rep})), \ \ rep(\text{Ex$_{JuviSuccess}$$\times$$\text{Ex$_{ReproProb}$}}, \ (NESH_{age}-NESH_{fi}
rst_rep+1)))

```
life_table<-data.frame(cbond(Age, Lx, Mx))

# Calculating Qx and Px to define the population without predation (Leslie Matrix)
# (original G&H 2011 growth estimates)
proj_mat<-matrix(rep(0,NESH_age*NESH_age),nrow=NESH_age)
for (i in 1:nrow(life_table)){
  if ((i == nrow(life_table))==T){
    life_table[i, 'Qx']<-1.0000
  }else{
    life_table[i, 'Qx']<-round(((life_table[i, 'Lx']-life_table[i+1, 'Lx'])/life_table[i, 'Lx'], digits = 4)
  }
  life_table[i, 'Px']<-(-life_table[i, 'Qx']) # this is the stable projection for comparison
}
for (ii in 1:nrow(life_table)){
  try(proj_mat[ii, ii]<-life_table[ii, 'Px'], T) # subtract by -0.038907 for completely stable pop (lambda exactly == 1)
}
# end of "i" loop
proj_mat<-proj_mat[1:(NESH_age-1),]
jk<-proj_mat

# The Growth Population Projection Matrix
# from G and H
Stable_Proj_mat<-as.matrix(rbind(Mx, jk), rownames.force= F) # make sure it is a square matrix
colnames(Stable_Proj_mat)<-NULL

eigenNP<-eigen.analysis(Stable_Proj_mat, zero=TRUE) # without strikes and without predation
Stable_Proj_matNP<-jk
MxNP<-Mx
```

# ###################################################################################################################################
# # STEP 1 ESTIMATING AFFECTS OF PREDATION #
# # Raw data from 2013 Raines North Bog, Pihea, Pohakea, and Upper Limahule
# # to define Breeding Success and Probability
# #
# # NESH_Monitord<-c(9, 41) # Active Burrows for Adult Estimate
# # NESH_MonWBrd<-c(7, 37)
# # NESH_MonWSucc<-c(4, 29)
# #
# # NESH_over_BrProb<-median(NESH_MonWBrd)/median(NESH_Monitord)
# # NESH_over_BrSucc<-median(NESH_MonWSucc)/median(NESH_MonWBrd)
# #
# # NESHReproProb<-0.547 # Ainley Average Reproductive Probability

# ###################################################################################################################################
# KESRP ESTIMATED PREDATION AFFECTS FOR X BREEDING PAIRS PER PRED
if(PredationEst == 1){
   LMH<-100
   LMHName<-'KSHCP_KESRP' # DEFINED BY KSHCP
}else{
   if(PredationEst == 2){
      LMH<-87.4675
      LMHName<-'GH_Low' # DEFINED IN G&H
   }else{
      if(PredationEst == 3){
         LMH<-72.2599
         LMHName<-'GH_Medium' # DEFINED IN G&H
      }else{
         LMH<-63.396
         LMHName<-'GH_High' # DEFINED IN G&H
      }
   }
}
KESRPBreedingPairs<-LMH #
AdultSubAdultSS<-(eigenNP$stable.stage[3:length(eigenNP$stable.stage)])/sum(eigenNP$stable.stage[3:length(eigenNP$stable.stage)]) # start at stage 3 (2-3 y/o survival) b/c it is when predation mortality starts
NumAdults<-2*KESRPBreedingPairs
AdultSubAdultForSANum<-(eigenNP$stable.stage[2:length(eigenNP$stable.stage)])/sum(eigenNP$stable.stage[2:length(eigenNP$stable.stage)])
# NumAdults<-(sum(AdultSubAdultSS[1:4])*(KESRPBreedingPairs*2)/sum(AdultSubAdultSS[5:length(AdultSubAdultSS)]))
# NumSubAdults<-(sum(AdultSubAdultForSANum[1:(NESHfirst_rep-1)])*(KESRPBreedingPairs*2)/sum(AdultSubAdultForSANum[1:NESHfirst_rep:length(AdultSubAdultForSANum)]))
NumSubAdults<- sum((AdultSubAdultSS[1:(NESHfirst_rep-2)]*(KESRPBreedingPairs*2))/sum(AdultSubAdultSS[1:(NESHfirst_rep-1):length(AdultSubAdultSS)])) # number of sub-adults predated (i.e. after year 2)
numChicks<-KESRPBreedingPairs # breeding pairs count assumes 100% breeding prob.

######## Overall Predation ####################
# Ungulate Predation
UngAdultPredation<-(8*AdultSubAdultSS[1:(NESHfirst_rep-1):length(AdultSubAdultSS)])) # adults >=6
UngSubAdultPredation<-(8*AdultSubAdultSS[1:(NESHfirst_rep-2)])) # subadults from age 2-5
UngChickPredation<-(UngAdultPredation*Ex_ReproProb)#NESHReproProb) # added all predated breeding adults to estimate chick predation due to parental death, estimated breeding probability to establish which to remove
PercUngPredAdults<- UngAdultPredation/NumAdults#divide Adult # by 2 to account for nocturnal/crepuscular predation= when only 1 individual of pair at nest at that time
PercUngPredSubAdults<-UngSubAdultPredation/NumSubAdults
PercUngPredChick<-UngChickPredation/numChicks# Any predation of adults would be a predation of chick as well...did not include breeding prob because this was already estimated here
Ung_NESHReproProb<- (UngAdultPredation*4)/NumAdults # quadruples time until reproduction so used it to modify repro. probability

#Cat Predation
CatAdultPredation<- sum((8*AdultSubAdultSS[(NESHfirst_rep-1):length(AdultSubAdultSS)])) # adults >=6
CatSubAdultPredation<- sum((8*AdultSubAdultSS[1:(NESHfirst_rep-2)])) # subadults from age 2-5
CatChickPredation<- 8+(CatAdultPredation*Ex_ReproProb)#NESHReproProb) # added all predated breeding adults to estimate chick predation due to parental death, estimated breeding probability to establish which to remove
PercCatPredAdults<- CatAdultPredation/NumAdults#divide Adult # by 2 to account for nocturnal/crepuscular predation= when only 1 individual of pair at nest at that time
PercCatPredSubAdults<- CatSubAdultPredation/NumSubAdults
PercCatPredChick<- CatChickPredation/numChicks# Any predation of adults would be a predation of chick as well...did not include breeding prob because this was already estimated here

Cat_NESHReproProb<- 0

#Rat Predation
RatAdultPredation<- 0 # adults >=6
RatSubAdultPredation<- 0 # subadults from age 2-5
RatChickPredation<- 12+(RatAdultPredation*Ex_ReproProb)#NESHReproProb) # added all predated breeding adults to estimate chick predation due to parental death, estimated breeding probability to establish which to remove
PercRatPredAdults<- RatAdultPredation/NumAdults#divide Adult # by 2 to account for nocturnal/crepuscular predation= when only 1 individual of pair at nest at that time
PercRatPredSubAdults<- RatSubAdultPredation/NumSubAdults
PercRatPredChick<- RatChickPredation/numChicks# Any predation of adults would be a predation of chick as well...did not include breeding prob because this was already estimated here

Rat_NESHReproProb<- 0

#Barn Owl Predation
BrOwlAdultPredation<- sum((1*AdultSubAdultSS[(NESHfirst_rep-1):length(AdultSubAdultSS)])) # adults >=6
BrOwlSubAdultPredation<- sum((1*AdultSubAdultSS[1:(NESHfirst_rep-2)]), na.rm = T) # subadults from age 2-5
BrOwlChickPredation<- 0.5+(BrOwlAdultPredation*Ex_ReproProb)#NESHReproProb) # added all predated breeding adults to estimate chick predation due to parental death, estimated breeding probability to establish which to remove
PercBrOwlPredAdults<- BrOwlAdultPredation/NumAdults#divide Adult # by 2 to account for nocturnal/crepuscular predation= when only 1 individual of pair at nest at that time
PercBrOwlPredSubAdults<- BrOwlSubAdultPredation/NumSubAdults
PercBrOwlPredChick<- BrOwlChickPredation/numChicks# Any predation of adults would be a predation of chick as well...did not include breeding prob because this was already estimated here

BrOwl_NESHReproProb<- 0
# making projection matrix bottom (not mortality/fertility information yet)

# Adding % adults removed by predators
#
# a_Ungulates<-PercUngPredAdults+PercUngPredSubAdults
# a_Cats<-PercCatPredAdults+PercCatPredSubAdults
# a_Rats<-PercRatPredAdults+PercRatPredSubAdults
# a_Owl<-PercBrOwlPredAdults+PercBrOwlPredSubAdults
# a_RatsCats<-a_Cats+a_Rats
# a_RatsOwl<-a_Cats+a_Owl

ad_RatsOwl<-PercRatPredAdults+PercBrOwlPredAdults
sa_RatsOwl<-PercRatPredSubAdults+PercBrOwlPredSubAdults
# a_All<-a_Ungulates+a_Cats+a_Rats+a_Owl
ad_All<-PercUngPredAdults+PercCatPredAdults+PercRatPredAdults+PercBrOwlPredAdults
sa_All<-PercUngPredSubAdults+PercCatPredSubAdults+PercRatPredSubAdults+PercBrOwlPredSubAdults

#######################################################
# Base Estimate all predators
Ex_AllPredAdults<-((PercUngPredAdults+PercUngPredSubAdults)+
(PercCatPredAdults+PercCatPredSubAdults)+
(PercRatPredAdults+PercRatPredSubAdults)+
(PercBrOwlPredAdults+PercBrOwlPredSubAdults)))

Ex_APredJuviSucc<-Ex_JuviSucc*((Ex_JuviSucc*PercRatPredChick)+(Ex_JuviSucc*PercCatPredChick))

Ex_APredReproProb<-Ex_ReproProb*((Ex_ReproProb*BrOwl_NESHReproProb)+(Ex_ReproProb*Rat_NESHReproProb))

proj_MatPred<-proj_mat
for (ii in (NESHfirst_rep-1):(nrow(life_table)-1)){
  try(proj_MatPred[ii, ii]<-proj_MatPred[ii, ii]-Ex_AllPredAdults, T)
} # end of ii

Bred<-Ex_APredJuviSucc
Rep<-Ex_APredReproProb

Mx<-c(rep(0, (NESHfirst_rep-1)), rep(Bred*Rep, (NESH_age-NESHfirst_rep+1)))
jk<-proj_MatPred[1:(NESH_age-1),]

dfMitSoc<-data.frame(matrix(nrow=13, ncol= RunTme))
proj_mat2<-jk

# Adding to the The Growth Projection Matrix
# from G and H
Stable_Proj_mat<-as.matrix(rbind(Mx, jk), rownames.force= F) #make sure it is a square matrix
colnames(Stable_Proj_mat)<-NULL
rownames(Stable_Proj_mat)<-NULL
eigen<-eigen.analysis(Stable_Proj_mat, zero=TRUE) # with predation without strikes

# Stable Stage distribution developed from Eigen analysis of the base model
stable.stage<-eigen$stable.stage
PredLamb<-eigen$lambda1
PredLamb

# Population Size at year 1 (now)
StanPopSizeYr1<-SPS*stable.stage # standing population size at year 1

# NonBreedOverlap<-MetaPopSize*stable.stage[c(2:5)]*Overlap
Mx<-c(rep(0, (NESHfirst_rep-1)), rep(Bred*Rep, (NESH_age-NESHfirst_rep+1)))
jk2<-proj_mat2[1:(NESH_age-1),]
Stable_Proj_mat<-as.matrix(rbind(Mx, jk2), rownames.force= F) #make sure it is a square matrix
colnames(Stable_Proj_mat)<-NULL
rownames(Stable_Proj_mat)<-NULL
eigenAllMort<-eigen.analysis(Stable_Proj_mat, zero=0)
CurrLambda<-eigenAllMort$lambda1
dfMitSoc[, 1]<-c(0, 0, 0, 0, 0, 0, 0, 0, 0, 0) # social attraction/exclusion starting population size
numBirdsAllprd<-c()# Social Attraction birds
NmBrdStPopAllPred<-c()# Birds already at site

CurrYear<-as.numeric(as.character(format(Sys.time(), "%Y"))) # Defining the year at which the tool was run

# Because the initial meta-population size was defined for 2011 (by Trevor Joyce in 2013) am updating to estimate the Meta-popSize during # the current time period using the predation estimate defined int he parameters
MetaPopSize<- MetaPopSize* (CurrLambda ^ (CurrYear-YearPopEstimated))

#################################################
# MAIN ASSESSMENT SECTION
# Determines the factors that affect the population size and the sensitivity of those factors
# to changes in the system
# Deterministic model to assess what happens without a fenced site

# NonBreedOverlap<-MetaPopSize*stable.stage[c(2:5)]*Overlap
Mx<-c(rep(0, (NESHfirst_rep-1)), rep(Bred*Rep, (NESH_age-NESHfirst_rep+1)))
jk2<-proj_mat2[1:(NESH_age-1),]
Stable_Proj_mat<-as.matrix(rbind(Mx, jk2), rownames.force= F) #make sure it is a square matrix
colnames(Stable_Proj_mat)<-NULL
rownames(Stable_Proj_mat)<-NULL
eigenAllMort<-eigen.analysis(Stable_Proj_mat, zero=0)
CurrLambda<-eigenAllMort$lambda1
dfMitSoc[, 1]<-c(0, 0, 0, 0, 0, 0, 0, 0, 0, 0) # social attraction/exclusion starting population size
numBirdsAllprd<-c()# Social Attraction birds
NmBrdStPopAllPred<-c()# Birds already at site

CurrYear<-as.numeric(as.character(format(Sys.time(), "%Y"))) # Defining the year at which the tool was run

# Because the initial meta-population size was defined for 2011 (by Trevor Joyce in 2013) am updating to estimate the Meta-popSize during # the current time period using the predation estimate defined int he parameters
MetaPopSize<- MetaPopSize* (CurrLambda ^ (CurrYear-YearPopEstimated))
### Deterministic model to assess what happens without a fenced site -------

```r
# for (i in seq(1, RunTme, 1)){ #RunTme
#   NmBrdStPopAllPred<-c()#####!!!!!!!
#   for(i in seq(1,2,1)){ #!!!!!!!

numBirds1<-rep(0, NESH_age)
Choices1<-c(Broad_Strt, Fence_Fin)
Choices2<-which.max(c(Broad_Strt, Fence_Fin))

if(i %in% c(seq(1, Choices1[Choices2], 1))){
  #######Standing Population Estimates
  if ( i == 1){
    SPSJ<-SPS*eigenAllMort$stable.stage
  }else{
    SPSJ<-NmBrdStPopAllPred[i-1]
  }

  AdSubAdSurv<-c(0,SPSJ*c(diag(jk2), 0))
  jnkSP<-Ex_APredJuviSucc*Ex_APredReproProb
  FledgSameYr<-sum(AdSubAdSurv[NESHfirst_rep:NESH_age], na.rm = T)*jnkSP/2
  NmBrdStPopSize<-c(FledgSameYr,AdSubAdSurv[-1])[-(NESH_age+1)]
  NmBrdStPopAllPred<-rbind(NmBrdStPopAllPred, NmBrdStPopSize)
}

  #######Social Attraction Site Estimates
  CurrLambda<-eigenAllMort$lambda1
  SocBirds<-0
  SocBurrows<-0
  SocAdults_Saved1<-0
  SocJuvi_Saved1<-0
dfMitSoc[,i]<-c(0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0)
  # Because the Social Attraction sites don't add anything until they're made = no additional protection or reduction
  numBirds1<-rep(0, NESH_age)
  numBirdsAllprd<-rbind(numBirdsAllprd, numBirds1)
}else{
  # estimates after control starts = complete implementation of the program
  NoSocAdMit<-Ex_AllPredAdults#ratioCtrlAdults_SocEx+(0.2191627*PercSocia
  NoSocJuvMit<-Ex_APredJuviSucc#ratioCtrlJuvi_SocEx
  NoSocRepr<- Ex_APredReproProb#Ex_APredReproProb + abs(ratioReproRate_SocEx)
  NoSocSuccc- Ex_APredJuviSucc#Ex_APredJuviSucc + abs(ratioCtrlJuvi_SocEx)
  Bred<-Ex_APredJuviSucc
  Rep<-Ex_APredReproProb

  plus2<-2
  plus1<-1
```

NonBreedOverlap <- (MetaPopSize * (PredLamb^i)) * stable.stage[c(2:5)] * Overlap
NonBreedOverlapAP <- -NonBreedOverlap

# cat('\n Non-breeders in year ', i, ' (years 2:5) that have the potential to get called in:', NonBreedOverlap)

Attraction <- -NonBreedOverlap * (1 - SitFidIn)
# Attraction profile of site

if (i == (Choices1[Choices2]+1)) {
  # if i is equal to the year after start
  ############## Standing Population Estimates

  if (i == 1) {
    SPSJ <- SPS * eigenAllMort$stable.stage
  } else {
    SPSJ <- NmBrdStPopAllPred[i-1,]
  }

  AdSubAdSurv <- c(0, SPSJ) * c(diag(jk2), 0)
  jnkSP <- Ex_APredJuviSucc * Ex_APredReproProb
  FledgSameYr <- (sum(AdSubAdSurv[NESHfirst_rep:NESH_age], na.rm = T)) * jnkSP

  NmBrdStPopSize <- c(FledgSameYr, AdSubAdSurv[-1])[-(NESH_age+1)]
  NmBrdStPopAllPred <- rbind(NmBrdStPopAllPred, NmBrdStPopSize)
}

else {
  ############## Standing Population Estimates
  if (i == 1) {
    SPSJ <- SPS * eigenAllMort$stable.stage
  } else {
    SPSJ <- NmBrdStPopAllPred[i-1,]
  }

  AdSubAdSurv <- c(0, SPSJ) * c(diag(jk2), 0)
  jnkSP <- Ex_APredJuviSucc * Ex_APredReproProb
  FledgSameYr <- (sum(AdSubAdSurv[NESHfirst_rep:NESH_age], na.rm = T)) * jnkSP

  NmBrdStPopSize <- c(FledgSameYr, AdSubAdSurv[-1])[-(NESH_age+1)]
  NmBrdStPopAllPred <- rbind(NmBrdStPopAllPred, NmBrdStPopSize)
}

############## Social Attraction Site Estimates
# defining the year to year population growth
# adding the number that come in to the year
# Adding the number that reproduce based on the previous years attraction via microphones

# the Number to add to reproduction
PrevYearSurv <- numBirdsAllprd[i-1,] * c(diag(jk2), 0) # (Broad_Strt+1)
```r
# adding two zeros the first because the assessment starts at year 0 and the second to move it up a year
PrevYearSurvA<-c(0, PrevYearSurvA)#
PrevYearSurvB<-PrevYearSurvA[-length(PrevYearSurvA)]

###Reproduction
ReproYr<-c(Stable_Proj_mat[1,]) # adding 0 because starts at year 0
NumBabies<-sum((numBirdsAllprd[i-1,1]/2)*ReproYr)#ReproYr#
NumBabies<-sum(PrevYearSurvB/2*ReproYr, na.rm = T)

PrevYearSurvB[2:(NESHfirst_rep-1)]<-PrevYearSurvB[2:(NESHfirst_rep-1)]*
(SitFidOut)
PrevYearSurvC<-PrevYearSurvB+numBirds1 #Removing year 0 and adding the number attracted[-1]
PrevYearSurvC[1]<-NumBabies
numBirdsAllprd<-rbind(numBirdsAllprd, PrevYearSurvC)

test1<-try((numBirdsAllprd[i,1]/(sum(numBirdsAllprd[i,NESHfirst_rep:NESH_age], na.rm = T)/2))/ReproYr[length(ReproYr)], T)
if(class(test1) == 'try-error'{
test1<-"out of bounds"
}
cat('\nTESTA (should equal 1)', test1, ':Number of Fledglings = ', (sum((numBirdsAllprd[i,NESHfirst_rep:NESH_age]), na.rm = T)/2)*ReproYr[length(ReproYr)])
}
}
} # end runtime in years

# Birds at Site (With all predation)
AllPredSiteBirds<-data.frame(NmBrdStPopAllPred)
rownames(AllPredSiteBirds)<-paste0('Year ', seq(1, RunTme, 1))
colnames(AllPredSiteBirds)<-paste0(seq(1, ncol(AllPredSiteBirds)), ' Years Old')

# Social Attraction Birds
numBirdsDataAllPred<-data.frame(numBirdsAllprd)
rownames(numBirdsDataAllPred)<-paste0('Year ', seq(1, RunTme, 1))
colnames(numBirdsDataAllPred)<-paste0(seq(1, ncol(numBirdsDataAllPred)), ' Years Old')

#############################################################################
##################DEFINING A PREDATOR EXCLUSION FENCE SITE TO INFORM SOCIAL ATTRACTION##################
#############################################################################

# Ages 7 and up adults have greater survivorship
Ex_Adults7up<-(Stable_Proj_matNP[NESHfirst_rep+1, NESHfirst_rep+1]*)((PercUngPredAdults+PercUngPredSubAdults)* Ungulate_Cntrl)+(Stable_Proj_matNP[NESHfirst_rep+1, NESHfirst_rep+1]*)((PercCatPredAdults+PercCatPredSubAdults)* Cat_Cntrl))
```

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\[
(\text{Stable\_Proj\_matNP}[\text{NESHfirst\_rep}+1, \text{NESHfirst\_rep}+1] * (\text{PercRatPredAdults} + \text{PercRatPredSubAdults}) \cdot \text{Rat\_Ctrl}) + \\
(\text{Stable\_Proj\_matNP}[\text{NESHfirst\_rep}+1, \text{NESHfirst\_rep}+1] * (\text{PercBrOwlPredAdults} + \text{PercBrOwlPredSubAdults}) \cdot \text{BrOwl\_Ctrl})
\]

# Ages 5-6 has lower survivorship for adults

\[
\text{Ex\_Adults} \leftarrow ((\text{Stable\_Proj\_matNP}[\text{NESHfirst\_rep}, \text{NESHfirst\_rep}] \cdot (\text{PercUngPredAdults} + \text{PercUngPredSubAdults}) \cdot \text{Ungulate\_Ctrl}) + \\
(\text{Stable\_Proj\_matNP}[\text{NESHfirst\_rep}, \text{NESHfirst\_rep}] \cdot (\text{PercCatPredAdults} + \text{PercCatPredSubAdults}) \cdot \text{Cat\_Ctrl}) + \\
(\text{Stable\_Proj\_matNP}[\text{NESHfirst\_rep}, \text{NESHfirst\_rep}] \cdot (\text{PercRatPredAdults} + \text{PercRatPredSubAdults}) \cdot \text{Rat\_Ctrl}) + \\
(\text{Stable\_Proj\_matNP}[\text{NESHfirst\_rep}, \text{NESHfirst\_rep}] \cdot (\text{PercBrOwlPredAdults} + \text{PercBrOwlPredSubAdults}) \cdot \text{BrOwl\_Ctrl}))
\]

\[
\text{Ex\_Juvi} \leftarrow ((\text{Ex\_JuviSucc} \cdot \text{PercUngPredChick}) \cdot \text{Ungulate\_Ctrl}) + \\
((\text{Ex\_JuviSucc} \cdot \text{PercCatPredChick}) \cdot \text{Cat\_Ctrl}) + \\
((\text{Ex\_JuviSucc} \cdot \text{PercRatPredChick}) \cdot \text{Rat\_Ctrl}) + \\
((\text{Ex\_JuviSucc} \cdot \text{PercBrOwlPredChick}) \cdot \text{BrOwl\_Ctrl})
\]

\[
\text{Ex\_ReproProbScen} \leftarrow ((\text{Ex\_ReproProb} \cdot \text{Ung\_NESHReproProb}) \cdot \text{Ungulate\_Ctrl}) + \\
((\text{Ex\_ReproProb} \cdot \text{Cat\_NESHReproProb}) \cdot \text{Cat\_Ctrl}) + \\
((\text{Ex\_ReproProb} \cdot \text{Rat\_NESHReproProb}) \cdot \text{Rat\_Ctrl}) + \\
((\text{Ex\_ReproProb} \cdot \text{BrOwl\_NESHReproProb}) \cdot \text{BrOwl\_Ctrl})
\]

# SOCIAL ATTRACTION (STARTING FROM SCRATCH) WITH EXCLUSION

\[
\text{Soc\_Ex\_Adults7up} \leftarrow \text{Ex\_Adults7up}
\]
\[
\text{Soc\_Ex\_Adults} \leftarrow \text{Ex\_Adults}
\]
\[
\text{Soc\_Ex\_Juvi} \leftarrow \text{Ex\_Juvi}
\]
\[
\text{Soc\_Ex\_ReproProb} \leftarrow \text{Ex\_ReproProbScen}
\]

# For Social Attraction

\[
\text{ratioCntrlAdults\_Soc\_Ex\_7up} \leftarrow (\text{Soc\_Ex\_Adults7up} \cdot \text{PercSocialExclusion})
\]
\[
\text{ratioCntrlAdults\_Soc\_Ex} \leftarrow (\text{Soc\_Ex\_Adults} \cdot \text{PercSocialExclusion})
\]
\[
\text{ratioCntrlJuvi\_Soc\_Ex} \leftarrow (\text{Soc\_Ex\_Juvi} \cdot \text{PercSocialExclusion})
\]
\[
\text{ratioReproRate\_Soc\_Ex} \leftarrow (\text{Soc\_Ex\_ReproProb} \cdot \text{PercSocialExclusion})
\]

# Making a deterministic model with predation

\[
\text{Bred} \leftarrow \text{Ex\_APredJuviSucc}
\]
\[
\text{Rep} \leftarrow \text{Ex\_APredReproProb}
\]
\[
\text{Mx} \leftarrow c(\text{rep}(\text{rep(0, (\text{NESHfirst\_rep} - 1))), \text{rep(\text{Bred} \cdot \text{Rep}, (\text{NESH\_age} - \text{NESHfirst\_rep} + 1))))}
\]
\[
\text{jk2} \leftarrow \text{proj\_mat2[1:(\text{NESH\_age} - 1),]}
\]
\[
\text{Stable\_Proj\_mat} \leftarrow \text{as.matrix(\text{rbind}(\text{Mx}, \text{jk2}, \text{rownames.force} = \text{F}))}
\]
s a square matrix
colnames(Stable_Proj_mat)<-NULL
rownames(Stable_Proj_mat)<-NULL
eigenAllMort<-eigen.analysis(Stable_Proj_mat, zero=0)
CurrLambda<-eigenAllMort$lambda1
dfMitSoc[, 1]<-c(\theta, \theta, \theta, \theta, \theta, \theta, \theta, \theta, \theta) # social attraction/exclusion starting population size
numBirds<-c()#rep(0, NESH_age)
StPopAllPred<-c() # Birds at site

#############################################################################
########### Deterministic model to assess what happens with a fenced site, ######
########### a standing population, and Social Attraction#############################
###########
#############################################################################
###########
# Deterministic model to assess overall mitigation effort for Soci -------
for (i in seq(1, RunTme, 1)){
  # numBirds1<-rep(0, NESH_age)
  # estimates the strike removal from the population prior to the start of control
  # Everything with Soc in it's name has to do with the social attraction population
  Choices1<-c(Broad_Strt, Fence_Fin)
  Choices2<-which.max(c(Broad_Strt, Fence_Fin))
  #
  # StPopAllPred<-c()
  #
  #
  # i = 1
  if(i %in% seq(1, Choices1[Choices2], 1)){ # Prior to Fencing
    ##############Standing Population Estimates
    if( i == 1){
      SPSJ<-SPS*eigenAllMort$stable.stage
    }else{
      SPSJ <- StPopAllPred[i-1,]
    }
    AdSubAdSurv<-c(0,PSPJ*c(diag(jk2), 0))
jnkSP<-Ex_APredJuviSucc*Ex_APredReproProb
    FledgSameYr<-sum(AdSubAdSurv[NESHfirst_rep:NESH_age], na.rm = T)*jnkSP/2
    SPSii1<-c(FledgSameYr,AdSubAdSurv[-1])[-(NESH_age+1)]
  }
  StPopAllPred<-rbind(StPopAllPred, SPSii1)
  ###############Social Attraction Site Estimates
  CurrLambda<-eigenAllMort$lambda1
SocBirds<-0
SocBurrows<-0
SocAdults_Saved1<-0
SocJuvi_Saved1<-0
dfMitSoc[,i]<-c(0, 0, 0, 0, 0, 0, 0, 0, 0, 0) # Because the Social Attraction sites don't add anything until they're made = no additional protection or reduction
numBirds1<-rep(0, NESH_age)
numBirds<-rbind(numBirds, numBirds1)
}else{
  # estimates after control starts = complete implementation of the program
  SocAdMit7up<-ratioCntrlAdults_SocEx7up#+(0.2191627*PercSocialExclusion)
  SocAdMit<-ratioCntrlAdults_SocEx#+(0.2191627*PercSocialExclusion)
  SocJuvMit<-ratioCntrlJuvi_SocEx # Only used for chick/fledgeing success
  SocRepr<- Ex_APredReproProb + abs(ratioReproRate_SocEx)
  SocSucc<- Ex_APredJuviSucc + abs(ratioCntrlJuvi_SocEx)

  # Stable_Proj_matNP
  plus2<-2
  plus1<-1
  for (mitty in c('Soc')){
    proj_mat3<-proj_mat2
    for (ii in life_table[2:nrow(life_table), 'Age']){
      if ((ii >= NESHfirst_rep-1)==T){ # Start at year 5 prospectors
        if(ii %in% c(5, 6)){
          try(proj_mat3[ii, ii]<-proj_mat2[ii,ii]+get(paste0(mitty, "AdMit")), T) # removing sub-adults
        }
        if(ii >= 7){
          try(proj_mat3[ii, ii]<-proj_mat2[ii,ii]+get(paste0(mitty, "AdMit7up")), T) # removing sub-adults
        }
      }else{
        try(proj_mat3[ii, ii]<-proj_mat2[ii,ii], T)#+get(paste0(mitty, "JuvMit")), T) # removing sub-adults
      } # end ii
    }
    MxMit<-c(rep(0, (NESHfirst_rep-1)), rep(get(paste0(mitty, "Repr")))*get(paste0(mitty, "Succ")), (NESH_age-NESHfirst_rep+plus1))
    jk2Mit<-proj_mat3[1:(NESH_age-1),]
    Stable_Proj_mat<-as.matrix(rbind(MxMit, jk2Mit), rownames.force= F) # make sure it is a square matrix
    colnames(Stable_Proj_mat)<-NULL
    rownames(Stable_Proj_mat)<-NULL
    eigenMit<-eigen.analysis(Stable_Proj_mat, zero=0)
    assign(paste0(mitty, 'eigenMit'), eigenMit)
\[
\text{NonBreedOverlap} \leftarrow (\text{MetaPopSize} \times (\text{PredLamb}^1) \times \text{stable.stage}[c(2:5)]) \times \text{Overlap}
\]

\[
\text{NonBreedOverlapNP} \leftarrow \text{NonBreedOverlap}
\]

\[
\text{Attraction} \leftarrow \text{NonBreedOverlap} \times (1 - \text{SitFidIn})
\]

\[
\text{if} (i == (\text{Choices1}[\text{Choices2}] + 1)) \{ \text{if } i \text{ is equal to the year after start}
\]

\[
\#	ext{Standing Population Estimates}
\]

\[
\text{if} (i == 1) \{
\quad \text{SPSJ} \leftarrow \text{SPS} \times \text{eigenMit}\$\text{stable.stage}
\}
\]

\[
\text{else}
\{
\quad \text{SPSJ} \leftarrow \text{StPopAllPred}[i-1,]
\}
\]

\[
\text{AdSubAdSurv} \leftarrow c(0, \text{SPSJ} \times c(\text{diag}(\text{jk2Mit}), 0))\]

\[
\text{jnkSP} \leftarrow \text{SocRep\$SocSucc}
\]

\[
\text{FledgSameYr} \leftarrow \text{sum} \left( \text{AdSubAdSurv}[\text{NESHfirst_rep}\text{NESH_age}], \text{na.rm} = \text{T} \right) \times \text{jnkSP}\]

\[
\text{SPSii2} \leftarrow c(\text{FledgSameYr}, \text{AdSubAdSurv}[-1])[-(\text{NESH_age}+1)]
\]

\[
\text{StPopAllPred} \leftarrow \text{rbind} \left( \text{StPopAllPred}, \text{SPSii2} \right)
\]

\[
\#	ext{Social Attraction Site Estimates}
\]

\[
\text{Juvis} \leftarrow \text{Attraction}
\]

\[
\text{numBirds1} \leftarrow c(\text{FledgSameYr}, \text{AdSubAdSurv}[-1])[-(\text{NESH_age}+1)]\]

\[
\text{StPopAllPred} \leftarrow \text{rbind} \left( \text{numBirds}, \text{numBirds1} \right)
\]

\[
\text{else}
\{
\#	ext{Standing Population Estimates}
\]

\[
\text{if} (i == 1) \{
\quad \text{SPSJ} \leftarrow \text{SPS} \times \text{eigenMit}\$\text{stable.stage}
\}
\]

\[
\text{else}
\{
\quad \text{SPSJ} \leftarrow \text{StPopAllPred}[i-1,]
\}
\]

\[
\text{AdSubAdSurv} \leftarrow c(0, \text{SPSJ} \times c(\text{diag}(\text{jk2Mit}), 0))\]

\[
\text{jnkSP} \leftarrow \text{SocRep\$SocSucc}
\]

\[
\text{FledgSameYr} \leftarrow \text{sum} \left( \text{AdSubAdSurv}[\text{NESHfirst_rep}\text{NESH_age}], \text{na.rm} = \text{T} \right) \times \text{jnkSP}/2
\]

\[
\text{SPSii3} \leftarrow c(\text{FledgSameYr}, \text{AdSubAdSurv}[-1])[-(\text{NESH_age}+1)]\]

\[
\text{StPopAllPred} \leftarrow \text{rbind} \left( \text{StPopAllPred}, \text{SPSii3} \right)
\]

\[
\#	ext{Social Attraction Site Estimates}
\]

\[
\text{numBirds1} \leftarrow c(\text{FledgSameYr}, \text{AdSubAdSurv}[-1])[-(\text{NESH_age}+1)]\]

\[
\text{StPopAllPred} \leftarrow \text{rbind} \left( \text{StPopAllPred}, \text{SPSii3} \right)
\]

\[
\#	ext{Adding the number that come in to the year}
\]

\[
\#	ext{Adding the number that reproduce based on the previous years attraction via microphones}
\]
### the Number to add to reproduction

PrevYearSurv<-c(1, PrevYearSurv)  
PrevYearSurvB<-PrevYearSurv[-length(PrevYearSurv)]

### Reproduction

ReproYr<-c(Stable_Proj_mat[1,])  
# adding 0 because starts at year 0  
# NumBabies<-sum((numBirds[i,]/2)*ReproYr)  
# [NESHfirst_rep:NESH_age]

# Total added  
PrevYearSurvB[2:(NESHfirst_rep-1)]<-PrevYearSurvB[2:(NESHfirst_rep-1)]*(SitFidOut)

PrevYearSurvC<-PrevYearSurvB+numBirds1  
# Removing year 0 and adding the number attracted

PrevYearSurvC[1]<-NumBabies  
numBirds<-rbind(numBirds, PrevYearSurvC)

# i = 10  

test2<-try((numBirds[i,1]/(sum(numBirds[i,NESHfirst_rep:NESH_age], na.rm = T))/2))/ReproYr[length(ReproYr)], T)  
if(class(test2) == 'try-error'){  
test2<"out of bounds"
}

cat('
\nTESTB (should equal 1)', test2, ':Number of Fledglings = ', (sum((numBirdsAllprd[i,NESHfirst_rep:NESH_age]))/2)*ReproYr[length(ReproYr)])

Overview<-paste0('SAS_Using_PredEst_ ', PredationEst, '_with_Site Fid_of_ ', SitFidIn)

Metadata<-rbind(MetaPopSize, Fence_Fin, Broad_Strt, Burrow_Cap, RunTme, PredationEst, SitFidIn, SitFidOut)  
rownames(Metadata)<-c('Meta-Pop Size = ', 'Year Fencing is Complete = ', 'Year Broadcasting Starts = ', 'Burrow Capacity of the Site = ', 'Years the Analysis is Run For = ', 'Predation Estimate = ', 'Juvenile Site Fidelity Value Within the Site = ', 'Juvenile Site Fidelity Value Outside of the Site = ')  
colnames(Metadata)<- 'MetaData of Analysis'

Dir2<-paste0(Dir, Overview, '/')  
if(file.exists(Dir2) == F){  
dir.create(Dir2)
}

StPopAllPredData<-data.frame(StPopAllPred)  
rownames(StPopAllPredData)<-paste0('Year ', seq(1, RunTme, 1))
colnames(StPopAllPredData)<-paste0(seq(1, ncol(StPopAllPredData)), ' Years Old')

# write.csv(Metadata, paste0(Dir2, 'MetaData.csv'))
numBirdsData<-data.frame(numBirds)
rownames(numBirdsData)<-paste0('Year ', seq(1, RunTme, 1))

# Lambda for the social attraction site is calculated differently. Because the social attraction site is 
# affected by the decrease in the meta-population, but always adds birds to the population, its growth must be compared with that of the social attraction site without any mitigation. That is what is done here.

tunction1<-apply(numBirdsData, 1, function(x){
  xrow <- which(sum(x) == apply(numBirdsData, 1, sum))
  round((1+((sum(x)-sum(numBirdsDataAllPred[xrow,:]))/sum(x)), 2))
})
lambda <- median(tunction1, na.rm = T)

# lambda<-round(1+abs((sum(numBirdsData[nrow(numBirdsData),])-sum(numBirdsData[nrow(numBirdsData)-1,:]))/sum(numBirdsData[nrow(numBirdsData),]), 2)
lambdaSP <- round(eigenMit$lambda1, 2)

write.csv(numBirdsDataAllPred, paste0(Dir2, 'All Predators Social Attraction Birds.csv'))
write.csv(AllPredSiteBirds, paste0(Dir2, 'All Predators for Standing Population.csv'))
write.csv(AllPredSiteBirds+numBirdsDataAllPred, paste0(Dir2, 'All Predators for ALL BIRDS.csv'))

write.csv(numBirdsData, paste0(Dir2, 'Predator Exclusion Social Attraction Birds.csv'))
write.csv(StPopAllPredData, paste0(Dir2, 'Predator Exclusion For Standing Population NO CARRYING CAPACITY.csv'))
write.csv(StPopAllPredData+numBirdsData, paste0(Dir2, 'Predator Exclusion for ALL BIRDS NO CARRYING CAPACITY.csv'))

AllBirds<-StPopAllPredData+numBirdsData
PropSPS<-StPopAllPredData/AllBirds # Proportion that is the standing population size
PropSA<-numBirdsData/AllBirds # Proportion that is the Social Attraction birds

png(filename = paste0(Dir2, " Social Attraction Site Population Site with a Standing Population Size Analysis.png"), width = 1000, height = 1000, pointsize = 18, type="cairo")

##########Defining carrying capacity for Social Attraction Sites#############
##
SE_K<-(Burrow_Cap/Rep)*2#PercSocialExclusion*1644912 # Social attraction Site Carrying Capacity (= percent area defined by social attraction, multiplied by total K for ENM)
# SE_K<- KCap*HAExclusion # 48.2 individuals per ha, ad hoc K defined in M&M for NESH strategy write up
OverSum<-apply(AllBirds, 1, sum)
OverSum2<-OverSum
OverSum2[which(OverSum2>SE_K)]<-SE_K

# applying K to the csv file
numBirdsDataTK<-AllBirds

for (Ni in which(OverSum>SE_K)){
  if(Ni < NESH_age){
    # Ni = 22
    SStsgd<-SoceigenMit$stable.stage[1:(Ni+2)]/sum(SoceigenMit$stable.stage[1:(Ni+2)], na.rm = T)
    ToApp<-SE_K*SStsgd
    numBirdsDataTK[Ni,]<-c(ToApp, rep(0, NESH_age-Ni))
  }else{
    SStsgd<-SoceigenMit$stable.stage
    ToApp<-SE_K*SStsgd
    numBirdsDataTK[Ni,]<-ToApp
  }
}

# numBirdsDataTK[21:22,]

write.csv(numBirdsDataTK*PropSA, paste0(Dir2, 'Predator Exclusion Social Attraction Birds WITH CARRYING CAPACITY.csv'))
write.csv(numBirdsDataTK*PropSPS, paste0(Dir2, 'Predator Exclusion For Standing Population WITH CARRYING CAPACITY.csv'))
write.csv(numBirdsDataTK, paste0(Dir2, 'Predator Exclusion for ALL BIRDS WITH CARRYING CAPACITY.csv'))

# ((apply((numBirdsDataTK*PropSPS)[,6:36], 1, sum)*get(paste0(mitty, "Repr")))/2)*get(paste0(mitty, "Succ"))

# write.csv(numBirdsDataTK, paste0(Dir2, 'Analysis Output per Age Class and Per Year WITH CARRYING CAPACITY.csv'))

plot(apply(numBirdsDataTK, 1, sum), type = 'l', bty = 'l', ylab = "Number of Birds (All Age Classes)", xlab = 'Year', lty = 1)

mtext("Social Attraction Site with Standing Population Analysis")
mtext("(the rate of site occupancy from Social Attraction is estimated using the overlap of the flight path with a proposed Social Attraction Site)", line = -2.5, cex = 0.8)
mtext(paste0('Population Size at Year ', RunTme, ' = ', round(apply(numBirdsDataTK, 1, sum)[paste0('Year ',RunTme)], 2)), line = -4, cex = 0.6)

upway <- 2
mtext(bquote(underline('Various Parameters Used in the Analysis')), cex = 0.7, col = 'red', line = -10 + upway, adj = 1, side = 3, font = 2)
mtext(paste0(rownames(Metadata)[1], round(Metadata[1,])), cex = 0.6,line = -10.5+ upway, adj = 1, side = 3)
mtext(paste0(rownames(Metadata)[2], Metadata[2,]), cex = 0.6,line = -11+ upwa
# SPS <- 500 #UserSpecified#

# # FENCE EFFICACY
# # Can use this section to assess either "leaky fence" or specific fence type scenarios,
# # values range from 0 to 1, where 1 is complete control, and 0 is no control.
# Ungulate_Cntrl <- 1 # Ungulate Control
# Rat_Cntrl <- 1 # Rat Control
# Cat_Cntrl <- 1 # Cat Control
# BrOwl_Cntrl <- 1 # Barn Owl Control

mtext(paste0('Starting Population Size at Site = ', SPS), cex = 0.6, line = -15.5, upway, adj = 1, side = 3)
mtext(paste0('Percent Ungulate Control = ', Ungulate_Cntrl*100, '%'), cex = 0.6, line = -16.5, upway, adj = 1, side = 3)
mtext(paste0('Percent Rat Control = ', Cat_Cntrl*100, '%'), cex = 0.6, line = -17, upway, adj = 1, side = 3)
mtext(paste0('Percent Barn Owl Control = ', BrOwl_Cntrl*100, '%'), cex = 0.6, line = -17.5, upway, adj = 1, side = 3)

upway <- upway + -6

SPFenceFledgeProd <- round(sum(numBirdsData[1:30, 1], na.rm = T) - sum(numBirdsDataAllPred[1:30, 1], na.rm = T))
SPFenceAdultProd <- round(sum(numBirdsData[30, 6:36], na.rm = T) - sum(numBirdsDataAllPred[30, 6:36], na.rm = T))

AddFled <- round(SPFenceFledgeProd + SPFenceFledgeProd)
AddAdult <- round(SPFenceAdultProd + SPFenceAdultProd)
AddFledCC <- `round(sum(numBirdsDataTK[1:30, 1]) - sum((AllPredSiteBirds+numBirdsDataAllPred)[1:30, 1]))
AddAdultCC <- `round(sum(numBirdsDataTK[30, 6:36]) - sum((AllPredSiteBirds+numBirdsDataAllPred)[30, 6:36]))

# PropSPS<StPopAllPredData/AllBirds # Proportion that is the standing population size
# PropSA<-numBirdsData/AllBirds # Proportion that is the Social Attraction birds

CCSPS <- (numBirdsDataTK*PropSPS)-(AllPredSiteBirds)
CCSPSFledge <- `round(sum(CCSPS[1:30, 1], na.rm = T))
CCSPSAult <- `round(sum(CCSPS[30, 6:36], na.rm = T))

CCSA <- (numBirdsDataTK*PropSA -(numBirdsDataAllPred))
CCSAFledge <- `round(sum(CCSA[1:30, 1], na.rm = T))
CCSAAult <- `round(sum(CCSA[30, 6:36], na.rm = T))

mtext(bquote(underline('Various Outputs From the Calculator'))), cex = 0.7, col = 'red', line = -16+ upway, adj = 1, side = 3, font = 2
mtext('Outputs Define the Difference Between Predated \nand Controled Populations', cex = 0.5, col = 'red', line = -17+ upway, adj = 1, side = 3)

mtext('With Carrying Capacity', cex = 0.6, col = 'blue', line = -18+ upway, adj = 1, side = 3, font = 2)
mtext(paste0("Added Adults at Year 30: ", AddAdultCC), cex = 0.6, line = -18.5 + upway, adj = 1, side = 3, font = 2)
mtext(paste0("-- from Social Attraction: ", CCSPSAult), cex = 0.6, line = -19 + upway, adj = 1, side = 3)
mtext(paste0("-- from Standing Population: ", CCSPSFledge), cex = 0.6, line = -19.5 + upway, adj = 1, side = 3)

mtext(paste0("Added Fledgelings until Year 30: ", AddFledCC), cex = 0.6, line = -20+ upway, adj = 1, side = 3, font = 2)
mtext(paste0("-- from Social Attraction: ", CCSAFledge), cex = 0.6, line = -20.5 + upway, adj = 1, side = 3)
mtext(paste0("-- from Standing Population: ", CCSPSFledge), cex = 0.6, line = -21+ upway, adj = 1, side = 3)

mtext('Without Carrying Capacity', cex = 0.6, col = 'blue', line = -21.5+ upway, adj = 1, side = 3, font = 2)
mtext(paste0("Added Adults at Year 30: ", AddAdult), cex = 0.6, line = -22+ upway, adj = 1, side = 3, font = 2)
mtext(paste0("-- from Social Attraction: ", SAFenceAdultProd), cex = 0.6, line = -22.5+ upway, adj = 1, side = 3)
mtext(paste0("-- from Standing Population: ", SPFenceAdultProd), cex = 0.6, line = -23+ upway, adj = 1, side = 3)
mtext(paste0("Added Fledgelings until Year 30: ", AddFled), cex = 0.6, line = -23.5+ upway, adj = 1, side = 3, font = 2)
mtext(paste0("-- from Social Attraction: ", SAFenceFledgeProd), cex = 0.6, line = -24+ upway, adj = 1, side = 3)
mtext(paste0("-- from Standing Population: ", SPFenceFledgeProd), cex = 0.6, line = -24.5+ upway, adj = 1, side = 3)
text(RunTme/4+10, apply(numBirdsData+StPopAllPredData, 1, sum)[RunTme/4], paste0('LAMBDA = Soc. Att.: ', lambda, ' / Stand. Pop.: ', lambdaSP), cex = 0.6)

if(RunTme == 30){
ad1 <- 0
ad2 <- 0
} else{
ad1 <- as.numeric(str_replace(names(apply(numBirdsData, 1, sum)[round(RunTme-30)]), 'Year ', ''))
ad2 <- apply(numBirdsData+StPopAllPredData, 1, sum)[round(RunTme-30)]
}

arrows(RunTme/4+10, apply(numBirdsData+StPopAllPredData, 1, sum)[RunTme/4], ad1, ad2, lty = 2, length = 0.1)

graphics.off()

cat('\nEnd Metapopulation Size = ', (MetaPopSize*(PredLamb^i)), ':BurrowCapacity = ', Burrow_Cap, ':Predation Lambda = ', PredLamb, ':SA Lambda = ', lambda, ': SA Reproductive Success = ', ReproYr[6])

if((DEM != 'None') == T){

DEMRas <- raster(DEM)
DEMRas_UTM <- projectRaster(DEMRas, crs = utmSys)

DEM_UTM <- DEMRas_UTM
Slope <- terrain(DEM_UTM, opt = 'slope')
Aspect <- terrain(DEM_UTM, opt = 'aspect')
HShade <- hillShade(Slope, Aspect, angle = 215, direction = 315)

col4 <- colorRampPalette(c("antiquewhite1", 'yellow', 'orange', 'brown', 'gray10', 'red', 'purple', "blue", "green")&c("antiquewhite1", "purple", "orangered", "gray", "blue", "yellowgreen", "darkgreen"))
ourcolors <- col4(400)

graphics.off()
png(filename = paste0(Dir2, "Plot of the Social Attraction Site and Buffer.png"), width = 1000, height = 1000, pointsize = 18, type="cairo")
par(las = 0, cex.axis = 0.8, bty = c("l"), cex.lab = 1, mar=c(5, 4, 4, 4) + 0.1)
plot(HShade, col=gray(c(100:0/100)), legend = F, alpha = 0.35, bty = 'l', main = paste0('Social Attraction Site with an Attraction Buffer of ', ExclusBuffer, ' meters'))
plot(raster(FlightPath), add= T, alpha = 0.5, col = ourcolors, cex.axis= 0.75, legend.width=0.75, legend.shrink=0.65, legend.args=list(text='Scaled (0-1) Flight Path Overlap', #str_replace(int, '_BurrowSiteRaster', '')
side=4, font=1, line=2.5, cex=0.8, las = 3))
plot(KSHCP_AAS_UTMBuff, add = T, lty = 3)
plot(KSHCP_AAS_UTM, col = 'blue', add = T)
legend('bottom', legend = c('Social Attraction Site Buffer Perimeter'), bty = 'n', lty = 3)

dev.off()

}
cat('
Predation Reproductive Success:', Ex_APredJuviSucc)
SAFenceFledgeProd <- round(sum(numBirdsData[1:30, 1]) - sum(numBirdsDataAllPred[1:30, 1]))
SAFenceAdultProd <- round(sum(numBirdsData[30, 6:36]) - sum(numBirdsDataAllPred[30, 6:36]))
SPFenceFledgeProd <- round(sum(StPopAllPredData[1:30, 1]) - sum(AllPredSiteBirds[1:30, 1]))
SPFenceAdultProd <- round(sum(StPopAllPredData[30, 6:36]) - sum(AllPredSiteBirds[30, 6:36]))

cat('
Total Number of Fledgling produced prior to year 30: ', SAFenceFledgeProd + SPFenceFledgeProd)
cat('
Total Number of Adults produced at year 30: ', SAFenceAdultProd + SPFenceAdultProd)

# error testing if/then after this

}
## Warning: package 'rgeos' was built under R version 3.5.3
## rgeos version: 0.4-3, (SVN revision 595)
## GEOS runtime version: 3.6.1-CAPI-1.10.1
## Linking to sp version: 1.3-1
## Polygon checking: TRUE

## Warning: package 'stringr' was built under R version 3.5.3
## Warning: package 'popbio' was built under R version 3.5.2

## Attaching package: 'popbio'

## The following object is masked from 'package:raster':
## resample

## OGR data source with driver: ESRI Shapefile
## Source: "J:\PIOGIS\12\APPS\SH_CC\Adam\KSHCP Social Attraction Site", layer: "Exocarpocos_SAS"
## with 1 features
## It has 1 fields
## Flight Path Overlay Value Used = 0.03252209
## Burrow Capacity of Site = 199.8

## Warning in rbind(Mx, jk): number of columns of result is not a multiple of vector length (arg 1)

## 2019 Meta-Population Size Using the Predation Estimate 3 = 11651.89
## TESTA (should equal 1) 1 :Number of Fledglings = 0.5726766
## TESTA (should equal 1) 1 :Number of Fledglings = 1.449019
## TESTA (should equal 1) 1 :Number of Fledglings = 2.455475
## TESTA (should equal 1) 1 :Number of Fledglings = 3.477351
## TESTA (should equal 1) 1 :Number of Fledglings = 4.203724
## TESTA (should equal 1) 1 :Number of Fledglings = 4.720902
## TESTA (should equal 1) 1 :Number of Fledglings = 5.084453
## TESTA (should equal 1) 1 :Number of Fledglings = 5.333392
## TESTA (should equal 1) 1 :Number of Fledglings = 5.495252
## TESTA (should equal 1) 1 :Number of Fledglings = 5.582573
## TESTA (should equal 1) 1 :Number of Fledglings = 5.607855
## TESTA (should equal 1) 1 :Number of Fledglings = 5.82482
## TESTA (should equal 1) 1 :Number of Fledglings = 5.516482
## TESTA (should equal 1) 1 :Number of Fledglings = 5.418481
## TESTA (should equal 1) 1 :Number of Fledglings = 5.29553
## TESTA (should equal 1) 1 :Number of Fledglings = 5.153551
## TESTA (should equal 1) 1 :Number of Fledglings = 4.997329
## TESTA (should equal 1) 1 :Number of Fledglings = 4.830914
## TESTA (should equal 1) 1 :Number of Fledglings = 4.657639
## TESTA (should equal 1) 1 :Number of Fledglings = 4.480246
## TESTA (should equal 1) 1 :Number of Fledglings = 4.300978
## TESTA (should equal 1) 1 :Number of Fledglings = 4.121655
## TESTA (should equal 1) 1 :Number of Fledglings = 3.943745
## TESTA (should equal 1) 1 :Number of Fledglings = 3.768417
## TESTA (should equal 1) 1 : Number of Fledglings = 3.596593
## TESTA (should equal 1) 1 : Number of Fledglings = 3.428987
## TESTA (should equal 1) 1 : Number of Fledglings = 3.266139
## TESTA (should equal 1) 1 : Number of Fledglings = 3.108446
## TESTA (should equal 1) 1 : Number of Fledglings = 2.956186
## TESTB (should equal 1) 1 : Number of Fledglings = 1.15144
## TESTB (should equal 1) 1 : Number of Fledglings = 2.913439
## TESTB (should equal 1) 1 : Number of Fledglings = 4.937047
## TESTB (should equal 1) 1 : Number of Fledglings = 6.99166
## TESTB (should equal 1) 1 : Number of Fledglings = 8.452126
## TESTB (should equal 1) 1 : Number of Fledglings = 9.491977
## TESTB (should equal 1) 1 : Number of Fledglings = 10.22294
## TESTB (should equal 1) 1 : Number of Fledglings = 10.72347
## TESTB (should equal 1) 1 : Number of Fledglings = 11.04891
## TESTB (should equal 1) 1 : Number of Fledglings = 11.22448
## TESTB (should equal 1) 1 : Number of Fledglings = 11.27531
## TESTB (should equal 1) 1 : Number of Fledglings = 11.22429
## TESTB (should equal 1) 1 : Number of Fledglings = 11.09159
## TESTB (should equal 1) 1 : Number of Fledglings = 10.89455
## TESTB (should equal 1) 1 : Number of Fledglings = 10.64739
## TESTB (should equal 1) 1 : Number of Fledglings = 10.36187
## TESTB (should equal 1) 1 : Number of Fledglings = 10.04777
## TESTB (should equal 1) 1 : Number of Fledglings = 9.713171
## TESTB (should equal 1) 1 : Number of Fledglings = 9.364779
## TESTB (should equal 1) 1 : Number of Fledglings = 9.008109
## TESTB (should equal 1) 1 : Number of Fledglings = 8.647667
## TESTB (should equal 1) 1 : Number of Fledglings = 8.287116
## TESTB (should equal 1) 1 : Number of Fledglings = 7.929405
## TESTB (should equal 1) 1 : Number of Fledglings = 7.576886
## TESTB (should equal 1) 1 : Number of Fledglings = 7.231412
## TESTB (should equal 1) 1 : Number of Fledglings = 6.894418
## TESTB (should equal 1) 1 : Number of Fledglings = 6.56699
## TESTB (should equal 1) 1 : Number of Fledglings = 6.249928
## TESTB (should equal 1) 1 : Number of Fledglings = 5.94379

## Warning in dir.create(Dir2): 'C:\Users\avorsino\Desktop\KIUC_SPS-SA_FenceYr_2_CallYr_2_RunTime_32\SAS_Using_PredEst_3_with_Site Fid_of_0.85' already exists

## End Metapopulation Size = 1906.396 : BurrowCapacity = 199.8 : Predation Lambda = 0.9449999 : SA Lambda = 1.595 : SA Reproductive Success = 0.7128

## Predation Reproductive Success: 0.4028592
## Total Number of Fledglesings Produced prior to year 30: 487
## Total Number of Adults Produced at year 30: 72

# rbind(Mx, jk2)
#
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REFERENCES


Joyce, T.W. 2013. Abundance estimates of the Hawaiian Petrel (Pterodroma sandwichensis) and Newell’s Shearwater (Puffinus newelli) based on data collected at sea (1998-2011). Kaua‘i Island Utility Cooperative (KIUC), Kaua‘i, HI.


Smith, S., G. Thompson, and C.M. Perrins. 2001. A census of the Manx Shearwater (Puffinus
**puffinus** on Skomer, Skokholm and Middleholm, west Wales, Bird Study 48:3, 330-340, DOI: 10.1080/00063650109461232.


Kaua‘i Seabird Habitat Conservation Program (KSHCP)

Participant Inclusion Plan (PIP) Template

Name of Applicant/Participant

[Insert Name]
PART 1: Landowner & Property Information; Description of the Facilities; Avoidance & Minimization Measures; Monitoring of Take

Item 1. Provide the name of the landowner, business, agency, or institution and complete contact information. If the applicant/participant is different from the landowner, please attach power of attorney (or other documentation) allowing the party to act on the landowner’s behalf.

Participant/Applicant Name:

Physical Address/Location of Facility:

Mailing Address:

Primary Contact: Ownership Name:
Address:
Email:
Telephone:

Alternate Contact: Name:
Address:
Telephone:
Email:

Preparer Contact: Name:
Address:
Email:
Telephone:
Item 2. Provide the legal description of the property at which the existing facilities and Covered Activities are located, including Tax Map Key (TMK) number. Provide a survey of the property and site plan drawings showing the locations of the Covered Activities (lights), property boundaries, buildings & structures, and site features. If properties containing the Covered Activities comprise separate parcels please include all Tax Map Key numbers and maps.

Item 3. Describe the existing Covered Activities for which incidental take authorization is sought. Include list of buildings, type and description of lights present, purpose and location of lights and current seabird lighting accommodation in place (e.g. shielding, downward pointing, switched off during fledging season etc.). For “Types of lights” please use the following categories:

- Parking Lights
- Signage Illumination
- Wall-pack Building Lights
- Landscaping/Grounds/Accent/Bollards
- Indoor lights visible from outdoors
- Roof Floodlights
- Other Lights

Facility lighting plan may be submitted as lighting inventory. Photos may be attached. The suggested light table, and Green Sea Turtle assessment table below may each be modified as needed to provide the necessary information.
Table 1: Lighting at Facilities

<table>
<thead>
<tr>
<th>List of Buildings</th>
<th>Type/Description of Lights Present</th>
<th>Location</th>
<th>Purpose of the Lights</th>
<th>Describe any measures implemented to avoid or minimize take impacts to Covered Species</th>
</tr>
</thead>
<tbody>
<tr>
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</tbody>
</table>
Table 2: Green Sea Turtle Assessment for the Site & Facility

Please provide the information requested below to help determine if measures to avoid impacts to the Green Sea Turtle(s) from the effects of light attraction are required to be implemented at any of the facility(s), parcel(s), or site(s) included in this PIP. Please consult with staff from the DLNR and the USFWS to arrange a site visit, if needed, discuss measures to avoid impacts to the Green Sea Turtle, and provide further guidance.

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
<th>Follow-up Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are any of the facilities located adjacent to a beach?</td>
<td>Yes / No</td>
<td>If yes, provide length of beach frontage &amp; brief description of facilities &amp; lights adjacent to the beach</td>
</tr>
<tr>
<td>Are any of the Covered Activities (lights) visible from a beach?</td>
<td>Yes / No</td>
<td>If yes, describe the specific lights (type, , height, purpose) &amp; specific location; provide map &amp; photos showing distance from beach</td>
</tr>
<tr>
<td>Have green sea turtles been known to nest on any beaches adjacent to the facilities?</td>
<td>Yes / No</td>
<td>If yes, provide information about nesting occurrences, if known, including location and date and any other information</td>
</tr>
</tbody>
</table>
Item 4. If applicable, describe any lighting standards (e.g., foot candles/area) required for facility operations or other requirements that necessitate the use of lighting (e.g., required for security, safety, operations). Describe the relevant standard, or regulation, and the areas and Covered Activities at the site (e.g., type of lighting) to which it applies.
Item 5. Describe any plans/proposals for future facilities or expansion of existing facilities. Include any proposed structures and lighting by type, purpose, and location. Plans (architecture and site plans), photos, and drawings can be attached.
Item 6. Pursuant to the Endangered Species Act (ESA), Section 10 (a)(2)(A)(iii), describe alternatives to avoid the taking considered and evaluated. Provide reasons why those alternatives are not being utilized. Alternatives can include operational or facility design changes (attach pages as needed). The tables below may be altered as needed.
### Table 3: Light Attraction Alternatives to the Taking

<table>
<thead>
<tr>
<th>Artificial Light Attraction Alternatives to the Taking Considered</th>
<th>Reasons Alternatives are not Being Utilized (provide justification)</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Deactivate all outdoor artificial lights from dusk to dawn during the fledgling fall-out season September 15 to December 15</td>
<td></td>
</tr>
<tr>
<td>▪ Change operations to eliminate the need for outdoor artificial lighting (e.g., from nighttime to daylight hours)</td>
<td></td>
</tr>
<tr>
<td>▪ Shield all lights from visibility from the beach, or screen all Green Sea Turtle nests, from May 15 to December 15 to avoid impacting the green sea turtle (Green Sea Turtle)</td>
<td></td>
</tr>
<tr>
<td>▪ Other alternatives to the taking considered, if any. If facility is proposed, include alternative designs considered</td>
<td></td>
</tr>
</tbody>
</table>
Item 7. Describe all site-specific seabird minimization measures considered for the Covered Activities. This item should follow KSHCP minimization objectives and measures as specified in Appendix E (Guidelines for Adjusting Lighting at Facilities) of the KSHCP document. Please consult with staff from the DOFAW and the USFWS as needed. The suggested tables below can be altered as needed.

Minimization measures modify the Covered Activities to reduce the effects of the activity on the Covered Species. KSHCP Participants will be required to implement minimization measures that apply to the facility to the “maximum extent practicable” per applicable state and federal laws which regulate incidental take license/permit issuance by the DLNR and the USFWS.

Minimization also entails searching and recovering grounded seabirds to minimize the chance of mortality. In addition, the presence of on-site predators (i.e. feral cats, dogs) should be controlled and removed because these animals can prey on grounded seabirds.

Provide justification, such as policies, regulations, or other rationale for measures that will not be implemented.
<table>
<thead>
<tr>
<th>Minimization Measures Considered</th>
<th>Feasible? (Y / N)</th>
<th>If not Feasible to Implement Measures, Provide Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Change time of light use (lights off earlier)</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Deactivate unnecessary lights</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Replace all outdoor lights with full cut-off fixtures</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Shield all outdoor lights with full cut-off shields</td>
<td>Yes / No</td>
<td></td>
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<tr>
<td>▪ Angle all lights downward</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Lower intensity (lumens) of outdoor lights</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Change bulb color to non-white spectrum</td>
<td>Yes / No</td>
<td></td>
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<tr>
<td>▪ Prohibit/control unleashed predatory animals; prohibit outdoor feeding of animals; require sealed rubbish containers</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Provide Worker Seabird Awareness Training to staff</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Provide outreach materials to staff &amp; guests</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Host Save Our Shearwaters (SOS) Aid Station</td>
<td>Yes / No</td>
<td></td>
</tr>
</tbody>
</table>
Item 8. **Minimization Plans.** Provide a plan to minimize the effects to the Covered Seabirds due to the Covered Activities. KSHCP Participants will be required to minimize the effects of the Covered Activities to the “maximum extent practicable” per applicable state and federal laws which regulate take license/permit issuance. The KSHCP document provides minimization objectives and measures to follow.

The Minimization Plans should include the proposed minimization measures, timeline, and estimated cost for each facility. In this item, the Participant can include measures already completed or in place (new lights, shields, operational changes). Timeline should include estimated completion schedule, and annual schedule for minimization that will occur only during fledging season.

Minimization measures not yet determined but anticipated to occur at the facility; this section should include an estimated cost that will be earmarked for future minimization measures.

If applicable, the participant must provide the reasoning why certain measures will not be implemented. The suggested table below may each be altered to best describe the Minimization Plan. Attach additional pages, photos, and drawings as needed.
Table 5: Lighting Minimization Measures

<table>
<thead>
<tr>
<th>List of Buildings</th>
<th>Minimization Measures</th>
<th>Cost to Implement</th>
<th>Responsible Staff</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
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<tr>
<td>Minimization Measures</td>
<td>Describe minimization method (e.g. trapping, outreach, enact policy)</td>
<td>Cost to Implement</td>
<td>Responsible Staff</td>
<td></td>
</tr>
<tr>
<td>---------------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------</td>
<td>-------------------</td>
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<td></td>
</tr>
<tr>
<td>Remove &amp; control loose predatory animals at the facility. (Loose animals can kill grounded seabirds and this measure aims to prevent seabird mortality by animals.)</td>
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<tr>
<td>Prohibit outdoor feeding of predatory animals. (Feeding animals attracts them to the site and this measure aims to reduce the presence of animals that can cause seabird mortality.)</td>
<td></td>
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<tr>
<td>Conduct nightly/morning searches to recover downed birds at the property &amp; turn them into SOS following protocols (see monitoring plan below).</td>
<td></td>
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<tr>
<td>Train staff to follow minimization measures.</td>
<td></td>
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</tbody>
</table>
Item 9. Take Monitoring Plan. Provide a plan to monitor take of the Covered Seabirds at the facilities proposed to be covered by the incidental take permit/license. The take monitoring plan describes how the property will be searched for downed Covered Seabirds. The KSHCP document provides standards and guidelines for take monitoring to ensure that take of the species is accurately measured and recorded.

The regulatory agencies will make the final determination as to the adequacy of the take monitoring plan.
### Table 7: Covered Seabird Take Monitoring Protocols

<table>
<thead>
<tr>
<th>Item</th>
<th>Protocol (fill in protocol &amp; provide reasons)</th>
<th>KSHCP Guideline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage of the total property that will be searched &amp; the total area to be searched</td>
<td></td>
<td>Search as much area as possible</td>
</tr>
<tr>
<td>Frequency of searches (# per day or per week)</td>
<td></td>
<td>Twice daily</td>
</tr>
<tr>
<td>Time of day of searches</td>
<td></td>
<td>2-3 hours after sunset, and within 3 hours after sunrise</td>
</tr>
<tr>
<td>Number of searchers per search area</td>
<td></td>
<td>Depends on site conditions and safety considerations and vegetation, nearby hazards/threats</td>
</tr>
<tr>
<td>Proposed training</td>
<td></td>
<td>Annual training covering seabird identification, seabird handling, response procedures, verified and documented</td>
</tr>
</tbody>
</table>
Item 10. Components of the Green Sea Turtle Minimization and Monitoring Plan (if required). Monitoring and minimization for the Green Sea Turtle is in two parts: A) Monitoring to detect nests and B) Monitoring and minimizing impacts to nests detected.

Part A: Monitoring to detect Green Sea Turtle Nests
Please provide the following information; the table below may be used and altered as needed.

1) Detailed location and description of beaches, including linear distance, at which searching for nests of the green sea turtle will take place. Searches should take place at any beach from which light at the facility can be viewed;

2) Monitoring protocols indicating:
   a) Annual training of searchers;
   b) Frequency of searches;
   c) Conduct active searching (searching the beach width);
   d) Sufficient number of trained searchers to cover the area; and
   e) Record results of search monitoring.

3) All Participants are required to record the results of search efforts. Records should provide:
   a) Evidence (what was seen). Include description and provide photographs
   b) Location on the beach (GPS) and physically mark the location if possible
   c) Date and time of day
   d) Description of surrounding land use (e.g., vacant, or developed), and
   e) Proximity to the facility.

Part B: Monitoring of Identified Green Sea Turtle Nests
Each identified nest of the green sea turtle should be monitored and protected from light attraction. Please provide the following monitoring protocols; the tables below may be used and altered as needed.

1. Light avoidance measure for identified nests (either shield/deactivate lights at the facility or install and maintain a light shield around each identified nest);
2. Frequency of searches;
3. Number of searches monitoring the nests. The number of needed to monitor active nests will depend on number of nests identified and amount of beach needed to be covered;
4. Record the results of nest monitoring. Monitoring should provide:
   a. Evidence of hatchling emergence (description and photos):
   b. Date and time of emergence,
   c. Direction of tracks,
   d. Condition of the nest area (e.g., disturbed or not).
### Table 8: Green Sea Turtle Monitoring Protocols – Part A: Monitoring to Detect Nests

<table>
<thead>
<tr>
<th>Item</th>
<th>Protocol (fill in protocol &amp; provide reasons)</th>
<th>KSHCP Guideline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location &amp; description of the beach, or beaches, surveyed and the linear distance of the beach</td>
<td></td>
<td>Beach area surveyed should coincide with visibility from the facility with the lights</td>
</tr>
<tr>
<td>Frequency of searches (# per day or per week)</td>
<td></td>
<td>Weekly during nesting season (typ. May 15 to end of August)</td>
</tr>
<tr>
<td>Number of searchers per search area</td>
<td></td>
<td>Depends on site conditions and safety considerations</td>
</tr>
<tr>
<td>Proposed training</td>
<td></td>
<td>Searchers should receive annual training conducted by the DLNR or the USFWS, or their designee (See item 9a)</td>
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</tbody>
</table>
Table 9: Green Sea Turtle Monitoring Protocols – Part B: Monitoring of Identified Nests & Minimization

<table>
<thead>
<tr>
<th>Item</th>
<th>Protocol (fill in protocol &amp; provide reasons)</th>
<th>KSHCP Guideline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency of checks (# per day or per week)</td>
<td></td>
<td>Active nests should be monitored every 1-2 days; then daily during expected hatching date</td>
</tr>
<tr>
<td>Light avoidance</td>
<td></td>
<td>If lights cannot be deactivated or shielded from the nest, each nest should be screened from visible light</td>
</tr>
<tr>
<td>Number of searchers per search area</td>
<td></td>
<td>Depends on site conditions and safety considerations</td>
</tr>
</tbody>
</table>
**Item 11.** Describe the schedule that will be followed to provide training for staff. Training must be provided to those that will conduct and oversee the searches at the facility.

The training should include:

1. Summary of regulations protecting the Covered Species;
2. Search procedures, route, frequency and timing specific to the facility’s monitoring plan, for seabirds and green sea turtle nests (if applicable);
3. Response procedures including safe and proper techniques for handling seabirds;
4. Recognizing evidence of green sea turtle nests, proper nest light screening, and hatchling activity (if green sea turtle minimization and monitoring plan is applicable);
5. Procedures to document the results of searches;
6. Downed wildlife agency contacts; and
7. Nearest SOS aid station.

**Rescuing Downed Seabirds—Standard Operating Procedures (SOP)**

The following steps provide the procedure for recovering downed seabirds found:

1. Take the seabird recovery kit and pet carrier to the downed seabird.
2. Put on gloves.
3. Using towel to gently cover the bird, pick up the seabird with wings folded in a natural position.
4. Place the seabird in the pet carrier, and close the pet carrier.
5. Put the gloves and towel back in the seabird rescue kit.
6. Take the bird and pet carrier to an SOS Aid Station.
7. Transfer the bird to the Aid Station’s pet carrier.
8. Call SOS at 632-0610 or 635-5117.
9. Return the seabird rescue kit and pet carrier.
11. Give the completed “Bird Take Field Report” to the General Manager, or other responsible staff person at the facility.

**Contents of Seabird Recovery Kit**

1. Latex or nitrile gloves;
2. Three towels;
3. Hand sanitizer;
4. Flashlight or headlamp;
5. Clipboard, pen and blank “Bird Take Field Reports”, or similar; and
6. Pet carrier—medium sized. If a box is used it must be well ventilated and marked conspicuously “LIVE ANIMAL”.
Item 12. Describe any outreach conducted (e.g., handing out pamphlets on seabird awareness to facility employees or guests, etc):
PART 2. Take Estimate, Requested Amount of Take Authorization, and Funding

Item 1. Show the calculation of estimated take for each of the Covered Species.

Following the take estimation methods in the KSHCP for estimating a Participant’s take (Section 6.2.2), the tables below show the take estimate calculation for the facility(s) for each of the Covered Seabirds.

The KSHCP take estimate method utilizes the average of the most recent 5 years of SOS recovery data for the facility. Applied to the data is an adjustment for downed birds not found, based on a 50% discovery rate and an adjustment based on SOS mortality (birds dead on arrival or those that die in care) – average SOS mortality is 12%.

If the landowner-applicant submits a take estimate with an alternate discovery rate, they must provide the reasons why an alternate rate was used to estimate take, including relevant information supporting their reasoning (% of searchable area, search protocols that will be used, any searcher efficiency trials that have been or will be conducted at facilities and/or demonstration of quick, effective recovery of birds). Please include narrative and/or photos and maps to support this.

<table>
<thead>
<tr>
<th>Table 10: Annual Take Calculation</th>
<th>Newell’s Shearwater</th>
<th>Hawaiian Petrel</th>
<th>Band-rumped Storm-petrel</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Annual average number (SOS data – or – monitoring data) of downed NESH (5 most recent years), HAPE or BRSP (15 most recent years)</td>
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<td>2. Annual observed lethal take estimate (12% of 1, all downed birds)</td>
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<tr>
<td>3. Annual unobserved lethal take estimate (e.g. 100% of 1, all downed birds if 50% searcher efficiency assumed)</td>
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<td>4. Total estimated annual lethal take from light attraction (2+3)</td>
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<td>Requested Annual Lethal Take</td>
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<tr>
<td>Requested Take Over Permit Term</td>
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</tbody>
</table>
**Item 2.** Select the requested take authorization and permit/license term coverage for each of the Covered Species.

**Table 11: Newell’s Shearwater:**

<table>
<thead>
<tr>
<th>Age Class</th>
<th>Annual Take Estimate: Fledglings</th>
<th>Annual Take Estimate: Adults or Sub-Adults</th>
<th>Take Limit for License/Permit Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortality (Lethal)</td>
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<tr>
<td>Injury (Non-lethal)</td>
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</tbody>
</table>

**Table 12: Hawaiian Petrel:**

<table>
<thead>
<tr>
<th>Age Class</th>
<th>Annual Take Estimate: Fledglings</th>
<th>Annual Take Estimate: Adults or Sub-Adults</th>
<th>Take Limit for License/Permit Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortality (Lethal)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Injury (Non-lethal)</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

**Table 13: Band-Rumped Storm Petrel:**

<table>
<thead>
<tr>
<th>Age Class</th>
<th>Annual Take Estimate: Fledglings</th>
<th>Annual Take Estimate: Adults or Sub-Adults</th>
<th>Take Limit for License/Permit Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortality (Lethal)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Injury (Non-lethal)</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
Item 3. Funding Assurance. Provide proof of adequate funding (see KSHCP document). All participants must demonstrate requisite funding prior to permit/license approval to ensure that the proposed measures and actions, including monitoring, will be undertaken in accordance with the terms and schedule of the KSHCP.

Signature of Participant: __________________________________________

Printed Name: _________________________________________________

Date: __________________

The undersigned affirms that all the information included is true and accurate to the best of the participant’s knowledge and that this PIP is voluntarily submitted.

☐ check to waive confidentiality
Appendices

Appendix A –
Appendix B –
Appendix C –
Appendix D –
Appendix E –
Appendix F –
Appendix G –
Appendix H –
APPENDIX E: Guidelines for Adjusting Lighting at Facilities

This appendix provides detailed guidelines to inform minimization measures that can be customized to address an array of possible lighting issues at Participant facilities. A lighting minimization plan to achieve the maximum extent practicable will be included in each Participant PIP.

These guidelines represent best available science at the time of KSHCP permit issuance. Over the life of the plan, likely new information and new technologies will be available, and this appendix may be updated accordingly.

Not all lighting guidelines are appropriate for all types of facilities. Some represent long term, infrastructure solutions, and others may be implemented on a seasonal basis.

1. Deactivate Non-Essential Lights

Prioritization of seabird and honu light attraction minimization measures involves evaluating light needs to determine if non-essential lights can be deactivated during the seabird fallout season (September 15 to December 15) and turtle nesting season (May 15-December 15). Deactivating the lights avoids the potential for light attraction that those lights could otherwise cause. Turning off a subset of lights, both unshielded and shielded, during the fallout season (September 15 to December 15) can assist with minimizing the risk of seabird light attraction, if those lights are not necessary. In their PIPs, Applicants must provide rationale for any facility lights that cannot be deactivated during seabird fallout season, and detail what other minimization practices will be implemented on lights that will remain illuminated. The regulatory agencies will review the evaluation and justification as provided in applicant PIPs.

Similarly, turning out lights that shine directly on beaches during the turtle nesting season (May 15-December 15) can prevent hatchling disorientation. Avoid use of the following lamp styles on beachside or shore perpendicular to sides of a structure: private balcony lights, up lights; decorative lighting, not necessary for human safety or security; pond lights; and beach lighting. Timers or other similar devices should be used to ensure the selected lights remain off during the turtle nesting season. This measure may require the installation of independent light switches. Conversely, to prevent accidental activation, light fixtures can be removed for lights that will no longer be needed at a facility.

2. Install Full Cut-off Light Fixtures

A full cut-off fixture refers to a light fixture which that does not shine light above a 90 degree horizontal plane. For lights necessary to be activated, full cut-off fixtures provide an effective
measure to achieve light minimization because they prevent light from shining directly upward. These types of lights house the light bulb up within the fixture so that no bulb protrudes below (Figure 1). Such fixtures must be mounted at appropriate angle so they point directly down to the ground. Many light manufacturers provide light fixture information along with the light specifications to indicate if a fixture is a full cut-off design. The International Dark Sky Association (www.darksky.org) is a good source for information on full cut-off lights and provides additional references to light engineering resources and light manufactures.

![Figure 1: Examples of full cut-off light fixtures. Source: www.darksky.org.](image)

Along shorelines, exterior fixtures on the seaward (makai) and the shore perpendicular sides of the building (and on the landward side of the building if they are visible from the beach) should be down-lit fixtures, fully shielded and full cut-off, louvered, or recessed fixtures that do not have reflective inner surfaces. These fixtures should use low wattage bulbs (e.g., < 50w). All exterior fixtures on the landward (mauka) side of the building should be directed downward only (Witherington & Martin 2003).

### 3. Shielding Light Fixtures

This minimization measure aims to achieve the functional equivalent of a full cut-off light fixture by installing a shield, visor, hood or similar on an existing light fixture to prevent light from shining upward and reducing trespass. In addition to the shielding, to achieve the functional equivalent of a full cut-off fixture, a light fixture should be adjusted so that it points directly down perpendicular to the ground to create a level, horizontal plane between the
fixture and the ground, and have the bulb housed within the light fixture (Figures 2 & 3). Reed et al. (1985) suggest that in areas where other light sources are rare, the shielding of principal lights would likely have a larger effect in decreasing seabird light attraction.

Figure 1: Installation of an appropriately sized floodlight shield. Source: [www.darksky.org](http://www.darksky.org).

Figure 2: Before and after effects of shielding and light management designed to minimize light attraction risk to seabirds and to decrease light pollution. Source: [www.darksky.org](http://www.darksky.org).

4. Angle Lights Downward

Angling and repositioning lights presents a potential alternative to shielding or replacing light fixtures and may be sufficient to make lights fully cut-off and eliminate light shining horizontally and vertically (Figure 4). To achieve the functional equivalent of a full cut-off fixture, a light
fixture should be adjusted so that it points directly down perpendicular to the ground to create a level, horizontal plane between the fixture and the ground, and have the bulb housed within the light fixture. Tree strap downlights may be used to minimize seabird light attraction unless turtles may be present on the adjacent beach.

![Light fixtures](image)

Figure 4: (a) Wall mount cylinder down-light, (b) bollards with downward-directed louvers, and (c) sign lights angled downward. From [http://myfwc.com/media/418417/SeaTurtle_LightingGuidelines.pdf](http://myfwc.com/media/418417/SeaTurtle_LightingGuidelines.pdf) (FWC 2011).

5. Place Lights Under Eaves

Light fixtures placed under building eaves can achieve the functional equivalent of a full cut-off fixture. The architectural eave acts as shield to prevent light from shining directly upward.

6. Shift Lighting According to the Moon Phase

This minimization measure addresses lighting for which the need, or purpose, for the lighting can be shifted in timing each year to coincide with the moon phase. Because a reduction in light attraction has been correlated with the full phase of the moon (Reed et al. 1985; Telfer et al. 1987) lights for essential functions, and for which that function can be shifted in timing, should coincide with the full phase of the moon and avoid the dark phase of the moon. It is important to note that a full moon that is obscured by heavy cloud cover could simulate the dark phase of the moon. By not activating those lights during the dark phase of the moon the effect of those lights is reduced. Examples of activities that could be minimized with this measure include scheduling of night time events, such as festivals or sporting events.

7. Install Motion Sensors for Motion-activated Lighting

Motion sensors switch lights on only when triggered, thereby limiting the time that the light stays on and reducing its potential for seabird light attraction. If a sensor light is required for security purposes, the light equipped with the sensor should be at low light levels. For example, Light Emitting Diode (LED) streetlights and parking lot lights can be activated when needed and dim when no activity is detected nearby. However for those fixtures, full cut-off designs or the functional equivalents are recommended because of the possibility of light
attraction occurring when the motion-sensor light is activated or in the event that the motion sensor equipment malfunctions and the light remains on.

Where motion sensors are impractical (e.g., at sporting events), stadium lights should be turned off as soon as the public leaves the stadium.

8. Decrease Lighting Levels

This measure addresses lowering light intensity levels (e.g., measured in lumens) while still meeting the need to safely complete tasks and serve the purpose of the light. Guidance on standards for the appropriate lighting level for a particular light function should be followed as provided by the appropriate agency or professional and technical organization. For example, the Illuminating Engineering Society of North America (IESNA) provides recommendations for light levels for several applications including parking lots, walkways, and roads. In addition, individual entities may have standards and best practices for lighting needs.

For many applications where lighting is needed, brighter lighting may not always provide the best lighting for the needed function. It is often the case where reduced lighting levels can provide for the needed function of the lighting. For example, for security purposes overly bright lights tend to create blind spots, or very dark shadows, outside the lit area that preclude effective visibility. Well placed, but reduced lighting can provide for more effective security. Therefore, when Participants seek to enhance onsite visibility for security, while reducing risk to seabirds, the appropriate reduction of light levels (along with shielding and re-angling lights) forms a starting point to accomplish both purposes.

9. Decrease Visibility of Interior Lights

Facilities with large and/or numerous windows, tall building profiles, or large glass facades may also pose a risk of light attraction to Covered Seabirds on Kaua‘i. The following measures are based, in part, on efforts in cities in Canada and the mainland USA to decrease harmful effects of buildings on birds and apply to seabirds in that they can decrease the amount of light escaping from within buildings (City of Toronto 2007; Evans Ogden 2002):

- Install screens or shades over large windows that are lowered nightly during the fallout season;
- Modify buildings and decrease or eliminate light glow from within a facility;
- Create glass opacity to prevent the escape of internal light. Tinted glass or film with a visible light transmittance value of 45 percent or less should be applied to all windows and doors within line of sight of the beach;
• Install physical screens outside a building;
• Install landscaping in front of large windows;
• Close all window blinds after daylight hours until sunrise;
• Stagger the operation of lights in the evening or morning hours so that not all lights are turned on at once; and
• Maximize the number of offices or indoor rooms that turn off all lights after sunset;
• Place reminder notices on switches to turn out lights or draw curtains/blinds in oceanfront rooms. This should include coastal areas that are on the perpendicular sides of the structure;
  a. Turn off room and lanai lighting that are not needed;
  b. Relocate moveable lamps away from windows that are visible from the beach; and
  c. Close opaque curtains or blinds after dark to block inside light from shining outside.

10. Use Light-less Technologies

Where conditions and facility needs permit, technologies that do not use light, such as closed-circuit television (CCT) with infrared illuminators, may be effectively employed to “see” at night thus enabling some of the lights to be turned off. For example, any fenced areas or the dark sides of facilities can be monitored with CCT so that lights do not need to be used or installed.

11. Plant Vegetation Around Lights to Reduce Light Visibility

Trees and shrubs can be planted so that they over-arch lights or shield side visibility of lights along the coast or along a ridge, for example. Whether the lights are mounted on 20-foot poles, walkways, or within landscaped areas, having adjacent or overarching vegetation would further reduce the risk of seabird light attraction that any residual light scatter may pose. Long-term planning and maintenance of screening vegetation is encouraged, where appropriate to the uses and needs of the affected lights.

12. Lower Height of Lights

Light that is low in height has potential to reduce the effect of light attraction because lower lights may be less visible to passing seabirds. Installing ground-level lighting, such as along walkways, and reducing pole height can decrease light waste and trespass.
13. Use Longer Light Wavelengths

In coastal areas, use of acceptable lights such as: LPS 18w, 35w, red, orange or amber LEDs (true red, orange or amber diodes, but not filters), true red neon, and other lighting sources that produce light wavelengths of 560 nm or longer (Witherington et al. 2014). Long wavelength lights, e.g., those that produce light that measures greater than 560 nanometers on a spectroscope, are required for all construction visible from and adjacent to sea turtle nesting beaches. Turtles are most sensitive to short wavelengths of light, probably because they live in a marine environment that filters out long wavelengths. Green turtles are least attracted to longer wavelength light in the yellow-orange to red end of the spectrum (630 to 700 nm) (Witherington and Martin 2000). In the absence of other light sources, however, turtles may still be attracted to long wavelength light.

Filters designed to exclude transmission of short wavelengths (<570nm) can be fitted to high pressure sodium (HPS) vapor lights. Such filters have been found to be effective at avoiding disruption of nesting females (Salmon, 2006) but even filtered HPS light has been found to attract hatchlings, although not as strongly as unfiltered HPS lights (Sella et al, 2006). Filtering alone is thus not sufficient to avoid attraction and disruption of hatchling orientation. Bright white light fixtures, such as metal halide, halogen, fluorescent, mercury vapor and incandescent lamps, are not approved for beachside or shore perpendicular sides of a structure. Limited use of shorter wavelength lights may be approved in areas where direct and indirect light or glow could not possibly be visible from the beach due to installation of opaque “light fencing” (see below).
Appendix F. Training and Outreach Materials

The Worker Seabird Awareness and Response Training materials that will be provided by the KSHCP are updated and will be available to Participants upon request. Materials consist of a slide presentation and handouts.

Handouts include:
- How to Pick Up a Seabird
- Seabird Recovery Protocols
- Seabird Identification Guide
- Green Sea Turtle Nest Searching Guide
How to Pick Up a Seabird

- Approach bird from behind, if possible
- Wrap a small towel around back and wings
- Gently pick up bird

Use gloves if needed
Disinfect hands after handling birds

- Always keep bird away from your face
- Birds are docile, but be aware of pointed bill

- Cover bird’s head
- Speak quietly & keep noise down

- Place bird in pet carrier or vented box
- Take birds to SOS Aid Station and place inside
- Fill out SOS information board

- Do not feed birds!
- Do not release birds!

Call SOS 635-5117
Kaua‘i Seabird Identification Guide

Hawaiian petrel – ‘ua‘u
Endangered species
Fledges Nov. to Dec.
Breeds in mountain areas

Newell’s shearwater – ‘a‘o
Threatened species
Fledges Sept. to Nov.
Only breeds on Kaua‘i; mostly in mountains

Band-rumped storm petrel – ‘ake‘ake
Candidate endangered species
Fledges in fall months
Uncommon & rare; breeds in cliff areas

Wedge-tailed shearwater – ‘ua‘u kani
Protected under Migratory Bird Treaty Act
Fledges Nov. to Dec.
Moderately aggressive - use safe handling
Commonly found at coastal areas

Contact Information:
Save Our Shearwaters: 808.632.0610 ext. 109; 808.635.5117
Provided by: DOFAW Kaua‘i Seabird Habitat Conservation Program Office 808.245.9160
42728 Rice Street, Lihue HI 96766  www.kauaseabirdhcp.com
Photos courtesy of DLNR (band-rumped storm petrel) and Brenda Zaun USFWS
Seabird Recovery Protocols Handout

1. Maintain supplies and recovery forms
   1. Medium-size pet carrier or ventilated box
   2. Small towel to wrap bird
   3. Flashlight/head lamp (for searching during dark)
   4. Protective gloves
   5. Gallon-size ziplock bags (for dead birds)
   6. Hand disinfectant
   7. Seabird recovery forms and identification sheets

2. Search actively; designate observers
   1. Look under objects and vegetation – birds will hide
   2. Nocturnal seabirds are most active 1—3 hours after sunset and before sunrise but can be grounded at any time during the night or early morning

3. Pick up downed seabirds immediately & put in safe place (pet carrier or ventilated box) – refer to “how to pick up a seabird” handout

4. For dead seabirds found, place carcass in ziplock bag, store in freezer or cool place, call SOS to coordinate transfer: 635-5117

5. Deliver seabirds to Save Our Shearwaters (SOS) Aid Station – located at fire stations; call SOS 635-5117

6. Record information on forms & turn into management

7. Management submit forms to wildlife agencies

______________________________________
Save Our Shearwaters SOS, Kaua‘i Humane Society: 632-0610 (x109); 635-5117
Kaua‘i Seabird HCP office: 245-9160 office; 346-3489 mobile
Honu – Green Sea Turtle: Nesting and Hatching Season

Nesting season - Mid-May through Late-August:

Females return to nesting beaches to excavate nests and lay eggs. Females often return the same area that they hatched from and known nesting areas on Kaua‘i include beaches in Po‘ipu, Lihu‘e, and Princeville. During the cool of the night, female honu arrive on the beach and upon reaching the high-tide mark, dig their nest and lay their eggs. Nesting activity can be identified by the paths that females make from the ocean to the nest site.

Hatching season - July through late November-early December:

The date the female lays eggs will determine when the eggs hatch. It takes 60-65 days from when the female lays her eggs for them to hatch. A few days before the hatchlings emerge, there will be a depression above the nest from where the newly hatched turtles are digging to the surface of the sand.

If nesting is found on a beach adjacent to your property, please contact ____ for assistance blocking the nest site from beachgoers. If artificial light from your property is illuminating the beach, a light shield will need to be built around the nest. Contact ____ for assistance with the light shield. Hatchling turtles are disoriented from their path to the sea by artificial light.
APPENDIX G: KSHCP BUDGET DETAILS

This Appendix gives detailed information about the budget for the KSHCP mitigation project, including contingency items and other costs such as inflation and compliance monitoring. This appendix is for the Implementing Fund only, it does not include the Reserve Account for funding assurances, changed circumstances, and adaptive management.

Cost for implementing minimization, monitoring and other facility-specific actions by individual Applicants is not included in this Appendix, but is also required to meet KSHCP permit criteria.

Given the selected mitigation project (predator proof fence and social attraction site), and the importance of beginning mitigation benefit as soon as possible, Year 1 cost for the KSHCP is substantially higher than subsequent years due to initial fence construction and predator removal costs that will occur in Year 1 of the Program.

The budget tables presented in this Appendix were derived estimates based on 2019 costs, and an assumed rate of inflation at 3% will be applied annually. Project costs will not be finalized until a formal bid process has been completed by the primary contractor. All of these budgetary items should be considered as estimates.

**Budget Tables**

**Table 1. Overview of funding for the KSHCP mitigation project, reflecting initial higher costs for Year 1 (fence construction and predator removal)**

<table>
<thead>
<tr>
<th>Item</th>
<th>Year 1</th>
<th>Annual cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salaries</td>
<td>$170,000.00</td>
<td>$97,500</td>
</tr>
<tr>
<td>Subcontracted expenses</td>
<td>$31,200.00</td>
<td>$3,800</td>
</tr>
<tr>
<td>Capital costs</td>
<td>$228,440.00</td>
<td>$2,000</td>
</tr>
<tr>
<td>Materials</td>
<td>$78,361.00</td>
<td>$20,827</td>
</tr>
<tr>
<td>Training</td>
<td>$3,000.00</td>
<td>$3,000</td>
</tr>
<tr>
<td>Travel</td>
<td>$11,815.00</td>
<td>$11,815</td>
</tr>
<tr>
<td>Misc</td>
<td>$2,670.00</td>
<td>$2,670</td>
</tr>
<tr>
<td>Contingency</td>
<td>$14,910.24</td>
<td></td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td>$540,396.24</td>
<td>$141,612</td>
</tr>
<tr>
<td><strong>Overhead</strong></td>
<td>$81,059.44</td>
<td>$21,242</td>
</tr>
<tr>
<td><strong>Contractor Total</strong></td>
<td><strong>$621,455.68</strong></td>
<td><strong>$162,854</strong></td>
</tr>
<tr>
<td>State</td>
<td>$10,000.00</td>
<td>$10,000</td>
</tr>
<tr>
<td>NFWF</td>
<td>$12,429.00</td>
<td>$3,355</td>
</tr>
<tr>
<td><strong>Overall total</strong></td>
<td><strong>$643,884.68</strong></td>
<td></td>
</tr>
</tbody>
</table>

Note- annual cost will increase by 3% each year to account for inflation
### Table 2. Potential responses and estimated costs for Changed Circumstances/Adaptive Management

<table>
<thead>
<tr>
<th>SCENARIO</th>
<th>ITEM</th>
<th>ESTIMATED COST</th>
<th>SOURCE/NOTES</th>
<th>POTENTIALY APPLICABLE YEAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fence delay</td>
<td>Increased cost to build fence</td>
<td>$42,426</td>
<td>Fence costs 25% more than expected</td>
<td>Year 1</td>
</tr>
<tr>
<td>Predators not eradicated in first attempt</td>
<td>Double effort (2X equipment)</td>
<td>$13,550</td>
<td></td>
<td>Year 1</td>
</tr>
<tr>
<td><strong>TOTAL that may be needed in Year 1</strong></td>
<td></td>
<td><strong>$55,976</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Birds not attracted to site</td>
<td>Double speaker system &amp; change soundtrack</td>
<td>$2,500</td>
<td></td>
<td>Year 3-4</td>
</tr>
<tr>
<td></td>
<td>Install decoys</td>
<td>$4,000</td>
<td></td>
<td>Year 3-4</td>
</tr>
<tr>
<td><strong>TOTAL that may be needed in Years 3-4</strong></td>
<td></td>
<td><strong>$6,500</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Birds not breeding at site</td>
<td>Replace all artificial burrows</td>
<td>$10,000</td>
<td></td>
<td>Years 4-7</td>
</tr>
<tr>
<td><strong>TOTAL that may be needed in Years 4-7</strong></td>
<td></td>
<td><strong>$10,000</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SOS not available</td>
<td>Vet care for non-lethal take birds</td>
<td>$500/bird</td>
<td>Cost depends on Participant take</td>
<td>Any year</td>
</tr>
<tr>
<td>Natural disaster destroys fence</td>
<td>Fence and social attraction equipment</td>
<td>$243,440</td>
<td>$213,440 + inflation + $15,000 + $15,000 X2</td>
<td>Any year</td>
</tr>
<tr>
<td></td>
<td>replacement &amp; repeat predator control</td>
<td></td>
<td>replacement threshold</td>
<td></td>
</tr>
<tr>
<td>Natural disaster requires vegetation</td>
<td>Replanting, invasive plant control &amp;</td>
<td>$25,000</td>
<td>Estimate from NTBG for plant survey and outplanting</td>
<td>Any year</td>
</tr>
<tr>
<td>restoration</td>
<td>erosion control</td>
<td></td>
<td>of native plants</td>
<td></td>
</tr>
<tr>
<td>Vandalism creates need for additional</td>
<td>Additional cameras and signage</td>
<td>$4,375</td>
<td>5 cameras &amp; mounts; signs</td>
<td>Any year</td>
</tr>
<tr>
<td>monitoring</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No continuation of site beyond 30 year term</td>
<td>Fence decommissioning</td>
<td>$42,438</td>
<td>50% of original cost (labor)</td>
<td>Year 30</td>
</tr>
<tr>
<td>Barn Owl removal not successful</td>
<td>Additional shooting nights/alt</td>
<td>$15,000</td>
<td></td>
<td>Any year</td>
</tr>
<tr>
<td></td>
<td>equip/expert help</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fence breach</td>
<td>Repeat of predator eradication</td>
<td>$15,000</td>
<td></td>
<td>Any year</td>
</tr>
<tr>
<td></td>
<td>(labor cost)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monitoring insufficient</td>
<td>Increase camera effort by 20%</td>
<td>$4,823</td>
<td></td>
<td>Any year</td>
</tr>
<tr>
<td><strong>Total that may be needed in any year</strong></td>
<td></td>
<td><strong>$350,076</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Kaua`i Seabird Habitat Conservation Plan

Draft

Participant Inclusion Plans

NCL (Bahamas) Ltd.
The Princeville Resort Kaua'i
Kaua'i Marriott Resort (Essex House Condominium Corporation)
Kaua'i Coffee Company, LLC
Sheraton Kauai Resort (Starwood Resorts)
County of Kaua'i
Hawaii'i Department of Transportation
Alexander & Baldwin, Inc.

August 2019
Kaua‘i Seabird Habitat Conservation Program (KSHCP)

Participant Inclusion Plan (PIP)

Name of Applicant/Participant
NCL (Bahamas) Ltd.
PART 1: Landowner & Property Information; Description of the Facilities; Avoidance & Minimization Measures; Monitoring of Take

Item 1. Provide the name of the landowner, business, agency, or institution and complete contact information. If the applicant/participant is different from the landowner, please attach power of attorney (or other documentation) allowing the party to act on the landowner’s behalf.

Participant/Applicant Name: NCL (Bahamas) Ltd.

Physical Address/Location of Facility: NCL (Bahamas) Ltd.
7665 Corporate Center Drive
Miami, Florida 33126

Mailing Address: Same as above

Primary Contact: Ownership Name: Daniel F. Farkas, Executive Vice President & Assistant General Counsel

Address: NCL (Bahamas) Ltd.
7665 Corporate Center Drive
Miami, Florida 33126

Item 2. Provide the legal description of the property at which the existing facilities and Covered Activities are located, including Tax Map Key (TMK) number. Provide a survey of the property and site plan drawings showing the locations of the Covered Activities (lights), property boundaries, buildings & structures, and site features. If properties containing the Covered Activities comprise separate parcels please include all Tax Map Key numbers and maps.

NCL (Bahamas) Ltd. (“NCL”) is seeking coverage for operation of artificial lighting in connection with all activities associated with its cruise ship operations in Hawaii. Currently, NCL operates one vessel in Hawaiian waters, this vessel is named the “Pride of America.” The vessel is legally identified as the NCL Pride of America. Its International Maritime Organization # is 9209221. In the future an additional vessel may be added to Hawaii operations.

Item 3. Describe the existing Covered Activities for which incidental take authorization is sought. Include list of buildings, type and description of lights present, purpose and location of lights and current seabird lighting accommodation in place (e.g. shielding, downward pointing, switched off during fledging season etc). For “Types of lights” please use the following categories:

- Parking Lights
- Signage Illumination
- Wall-pack Building Lights
Facility lighting plan may be submitted as lighting inventory. Photos may be attached. The suggested light table, and Green Sea Turtle assessment table below may each be modified as needed to provide the necessary information.

NCL is seeking coverage for all activities associated with operating its vessels, including but not limited to the Pride of America, in Hawaiian waters. These activities include, but are not limited to the following: general operation of the ship, port layovers, as well as all physical vessel maintenance activities. The Pride of America has a full complement of lights that one would expect on a cruise ship of this size, operating in US waters. Other vessels would have similar lighting.

The Pride of America is a U.S. flagged cruise vessel. The ship displaces approximately 81,000 tons, and is 920.6 feet long, 105.6 feet wide at the beam. The 15-deck, cruise vessel can carry 2,146 passengers and a crew of approximately 1,100. The vessel entered Hawaii service in July 2005. The vessel is home ported in Honolulu, and visits all of the main Hawaiian Islands on a weekly basis. Figure 1 illustrates a typical cruise track. Table 1 depicts a typical 2017-2018 cruise itinerary.

Figure 1- Typical weekly cruise track
On board ship lighting that may potentially attract seabirds include lights that are on exterior locations on decks, as well as in-cabin lighting that may be visible when curtains are not closed. In the following table exterior lighting and any other lights that may pose a risk to seabirds are identified by deck and type (Table 1). Seabird season lighting protocols that include the turning off and in some instances the dimming of certain lights avoid and minimize potential lighting impacts to the maximum extent currently practicable during the fledgling fallout season are discussed under Item 7.
### Table 1. Exterior Ship Lighting Inventory

<table>
<thead>
<tr>
<th>Location</th>
<th>Description</th>
<th>#</th>
<th># Bulbs</th>
<th>Wattage</th>
<th>Part # or description</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 Mooring Deck - Fwd.</td>
<td></td>
<td>25</td>
<td>2</td>
<td>40</td>
<td>4009</td>
</tr>
<tr>
<td>6 Open Deck Promenade Evacuation Deck</td>
<td></td>
<td>146</td>
<td>2</td>
<td>32</td>
<td>4043</td>
</tr>
<tr>
<td>7 Lifeboats Prep. Area PS + SB</td>
<td></td>
<td>52</td>
<td>2</td>
<td>32</td>
<td>4024</td>
</tr>
<tr>
<td>7 Crew Sun Deck</td>
<td></td>
<td>12</td>
<td>1</td>
<td>17</td>
<td>4020</td>
</tr>
<tr>
<td>6 Lifeboats Floodlight Overboard</td>
<td></td>
<td>15</td>
<td>1</td>
<td>500</td>
<td>4062</td>
</tr>
<tr>
<td>6 Lifeboats Floodlight Overboard</td>
<td></td>
<td>15</td>
<td>1</td>
<td>500</td>
<td>4062</td>
</tr>
<tr>
<td>11 Spotlight Showers</td>
<td></td>
<td>2</td>
<td>1</td>
<td>50</td>
<td>4272</td>
</tr>
<tr>
<td>12 Pool Aft. - Sun &amp; Passenger Deck</td>
<td></td>
<td>85</td>
<td>1</td>
<td>13</td>
<td>4259</td>
</tr>
<tr>
<td>13 Ships Name</td>
<td></td>
<td>2</td>
<td>20</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td>13 Bar &amp; Sports Area Deck Aft.</td>
<td></td>
<td>52</td>
<td>1</td>
<td>13</td>
<td>4259</td>
</tr>
<tr>
<td></td>
<td></td>
<td>24</td>
<td>2</td>
<td>32</td>
<td>4043</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6</td>
<td>2</td>
<td>60</td>
<td>4267</td>
</tr>
<tr>
<td>13 Open &amp; Viewing Deck Fwd.</td>
<td></td>
<td>54</td>
<td>1</td>
<td>13</td>
<td>4259</td>
</tr>
<tr>
<td></td>
<td></td>
<td>14</td>
<td>1</td>
<td>50</td>
<td>4265</td>
</tr>
<tr>
<td>14 Open Deck Area Aft.</td>
<td></td>
<td>34</td>
<td>2</td>
<td>32</td>
<td>4043</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9</td>
<td>2</td>
<td>17</td>
<td>4044</td>
</tr>
<tr>
<td>14 Open Deck Area Fwd.</td>
<td></td>
<td>13</td>
<td>1</td>
<td>13</td>
<td>4259</td>
</tr>
<tr>
<td>15 Funnel Light NCLA Logo</td>
<td></td>
<td>2</td>
<td>20</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td>15 Helicopter Pick Up Area</td>
<td></td>
<td>8</td>
<td>1</td>
<td>500</td>
<td>4062</td>
</tr>
<tr>
<td></td>
<td></td>
<td>26</td>
<td>1</td>
<td>13</td>
<td>4259</td>
</tr>
<tr>
<td>12-15+ Festival Light Aft. (String Lights)</td>
<td></td>
<td>1</td>
<td>67</td>
<td>25</td>
<td>60m. Length</td>
</tr>
<tr>
<td>15+ Festival Light Midship. (String Lights)</td>
<td></td>
<td>1</td>
<td>106</td>
<td>25</td>
<td>40.5m. Length</td>
</tr>
<tr>
<td>12-15+ Festival Light Fwd. (String Lights)</td>
<td></td>
<td>1</td>
<td>44</td>
<td>25</td>
<td>31.5m. Length</td>
</tr>
</tbody>
</table>
**Table 2: Green Sea Turtle Assessment for the Site & Facility**

Please provide the information requested below to help determine if measures to avoid impacts to the Green Sea Turtle(s) from the effects of light attraction are required to be implemented at any of the facility(s), parcel(s), or site(s) included in this PIP. Please consult with staff from the DLNR and the USFWS to arrange a site visit, if needed, discuss measures to avoid impacts to the Green Sea Turtle, and provide further guidance.

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes / NO</th>
<th>Information Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are any of the facilities located adjacent to a beach?</td>
<td>Yes / NO</td>
<td>If yes, provide length of beach frontage &amp; brief description of facilities &amp; lights adjacent to the beach.</td>
</tr>
<tr>
<td>Are any of the Covered Activities (lights) visible from a beach?</td>
<td>Yes / NO</td>
<td>If yes, describe the specific lights (type, height, purpose) &amp; specific location; provide map &amp; photos showing distance from beach.</td>
</tr>
<tr>
<td>Have green sea turtles been known to nest on any beaches adjacent to the facilities?</td>
<td>Yes / NO</td>
<td>If yes, provide information about nesting occurrences, if known, including location and date and any other information.</td>
</tr>
</tbody>
</table>
Item 4. If applicable, describe any lighting standards (e.g., foot candles/area) required for facility operations or other requirements that necessitate the use of lighting (e.g., required for security, safety, operations). Describe the relevant standard, or regulation, and the areas and Covered Activities at the site (e.g., type of lighting) to which it applies.

During the fledgling season NCL will avoid and minimize potential lighting related impacts to seabirds to the maximum extent practicable by implementing seabird friendly lighting protocols as allowed under the required industry and regulatory standards and protocols under which they operate a US flagged ship in U. S. waters.

Lighting standards and protocols for passenger vessels operating in U. S. waters fall under the jurisdiction of the United States Coast Guard, US Department of Homeland Security. Specific regulations covering lighting and security are contained in 33 CFR §104.100 et seq. 33 CFR §104.285 governs security measures and states in pertinent part:

“(a) General. (1) The vessel owner or operator must ensure the implementation of security measures and have the capability to continuously monitor, through a combination of lighting, watchkeepers, security guards, deck watches, waterborne patrols, automatic intrusion-detection devices, or surveillance equipment, as specified in their approved Vessel Security Plan (VSP)...” (Emphasis added.)

The federal regulations also address different Maritime Security (MARSEC) threat levels, and the required lighting measures that may be required by the United States Coast Guard at each escalating security threat level.

“(b) MARSEC Level 1. The vessel owner or operator must ensure the implementation of security measures, which may be done in coordination with a facility, to: ..... 

(5) Light deck and vessel access points during the period between sunset and sunrise and periods of limited visibility sufficiently to allow visual identification of persons seeking access to the vessel; and

(6) Use maximum available lighting while underway, during the period between sunset and sunrise, consistent with safety and international regulations......”

Under MARSEC level 2, the regulations state:

“(c) MARSEC Level 2. In addition to the security measures required for MARSEC Level 1 in this section, at MARSEC Level 2, the vessel owner or operator must also ensure the implementation of additional security measures, as specified for MARSEC Level 2 in the approved VSP. These additional security measures may include:

(2) Increasing the coverage and intensity of lighting, alone or in coordination with the facility;
(3) Using or increasing the use of security and surveillance equipment........”
Under MARSEC Level 3, the regulations state:

“(d) MARSEC Level 3. In addition to the security measures for MARSEC Level 1 and MARSEC Level 2, at MARSEC Level 3, the vessel owner or operator must ensure the implementation of additional security measures, as specified for MARSEC Level 3 in the approved VSP. These additional security measures may include:

(2) Switching on all lights;

(3) Illuminating the vicinity of the vessel....”


Additionally, the International Convention for Safety of Life at Sea (SOLAS) requires that emergency escape and assembling areas to be “well lit,” although no specific lux levels are given. SOLAS further requires that all emergency lighting, escape routes, deck lifeboat areas and assembling areas, will be inspected and approved by the United States Coast Guard.

**Item 5. Describe any plans/proposals for future facilities or expansion of existing facilities.**  
Include any proposed structures and lighting by type, purpose, and location. Plans (architecture and site plans), photos, and drawings can be attached.

Not applicable at this time

**Item 6. Pursuant to the Endangered Species Act (ESA), Section 10 (a)(2)(A)(iii), describe alternatives to avoid the taking considered and evaluated. Provide reasons why those alternatives are not being utilized. Alternatives can include operational or facility design changes (attach pages as needed). The tables below may be altered as needed.**

Activities that NCL has direct control over that may result in covered species landing on the vessel are restricted to those associated with lighting. Other programs that the NCL implements that result in benefits to seabirds include, but are not limited to, increased staff training, guest outreach, and monitoring and rapid recovery of downed seabirds. NCL has addressed all of these issues to the maximum extent practicable. Light avoidance and minimization measures considered are presented in Table 3. Those measures and protocols implemented are detailed in the following sections of the application.
<table>
<thead>
<tr>
<th>Artificial Light Attraction Alternatives to the Taking Considered</th>
<th>Reasons Alternatives are not Being Utilized (provide justification)</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Deactivate all outdoor artificial lights from dusk to dawn during the fledgling fall-out season September 15 to December 15</td>
<td>U.S. Coast Guard regulations do not permit ships to be dark at night</td>
</tr>
<tr>
<td>▪ Change operations to eliminate the need for outdoor artificial lighting (e.g., from nighttime to daylight hours)</td>
<td>U.S. Coast Guard regulations do not permit, SOLAS does not allow, crew and passenger safety and safety does not allow</td>
</tr>
<tr>
<td>▪ Shield all lights from visibility from the beach, or screen all Green Sea Turtle nests, from May 15 to December 15 to avoid impacting the green sea turtle (Green Sea Turtle)</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>▪ Other alternatives to the taking considered, if any. If facility is proposed, include alternative designs considered</td>
<td>Not Applicable</td>
</tr>
</tbody>
</table>
Item 7. Describe all site-specific seabird minimization measures considered for the Covered Activities. This item should follow KSHCP minimization objectives and measures as specified in Appendix E (Guidelines for Adjusting Lighting at Facilities) of the KSHCP document. Please consult with staff from the DOFAW and the USFWS as needed. The suggested tables below can be altered as needed.

Minimization measures modify the Covered Activities to reduce the effects of the activity on the Covered Species. KSHCP Participants will be required to implement minimization measures that apply to the facility to the “maximum extent practicable” per applicable state and federal laws which regulate incidental take license/permit issuance by the DLNR and the USFWS.

Minimization also entails searching and recovering grounded seabirds to minimize the chance of mortality. In addition, the presence of on-site predators (i.e. feral cats, dogs) should be controlled and removed because these animals can prey on grounded seabirds.

Provide justification, such as policies, regulations, or other rationale for measures that will not be implemented.

In 2007 a lighting review was conducted of the Pride of America by NCL’s seabird consultant and NCL’s Manager of Environmental & Regulatory Compliance. The purpose of the review was to determine which lights needed to be redirected, repositioned or turned off during the seabird season to reduce the potential that they would attract seabirds to the vessel, consistent with applicable federal regulations as noted above. These specific lighting protocols are presented in Table 4.

Table 4 details all of the lights that may pose an attractive risk to nocturnally flying seabirds including the number of fixtures, number of bulbs, wattage of each bulb, and the circuit breaker that controls each lighting circuit. Additionally, Table 1 provides the part number for each of the identified lighting fixtures. The manufacturer’s product descriptions for each part are included in Appendix B. A PowerPoint presentation that illustrates the vessels deck plan, and presents photographs of all of the lighting fixtures turned off during the annual seabird fallout season is included in Appendix C.

The ship’s environmental officer is responsible for ensuring that all of the lights detailed in Table 4 that need to be turned off during the seabird fallout season are in fact turned off. The particular circuit breakers than need to be turned off are identified in Table 4.

To calculate the reduction in illumination that the seabird fallout season light attraction and minimization plan provides, we multiplied the number of bulbs by the wattage of each bulb to arrive at a gross lighting wattage. The ships regular exterior lighting uses 53,369 watts of electricity. Deducting the wattage reduced by turning off the lights detailed in Table 4 during the seabird fallout season, which is calculated as 36,182 watts, represents a 68 percent reduction of light achieved by the avoidance and minimization plan. Since that retrofit additional lighting
minimization measures have been implemented including replacing all of the top side pool and stanchion lights with blue bulbs or blue coated bulb globes further reducing the amount of light output on the vessel.

The foregoing A&M measures have already been implemented, and costs associated with implementing these measures have already been incurred.

During the fledging season the following ship lighting is turned off, or left on.

Table 4. Light Attraction Avoidance & Minimization Plan

<table>
<thead>
<tr>
<th>Location</th>
<th>Description</th>
<th># Bulbs</th>
<th>Wattage</th>
<th>Switch</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Mooring Decl – Fwd.</td>
<td>25</td>
<td>2</td>
<td>40</td>
</tr>
<tr>
<td>7</td>
<td>Lifeboats Prep. Area PS + SB</td>
<td>52</td>
<td>2</td>
<td>32</td>
</tr>
<tr>
<td>7</td>
<td>Crew Sun Deck</td>
<td>12</td>
<td>1</td>
<td>17</td>
</tr>
<tr>
<td>6</td>
<td>Lifeboats Floodlight Overboard</td>
<td>15</td>
<td>1</td>
<td>500</td>
</tr>
<tr>
<td>6</td>
<td>Lifeboats Floodlight Overboard</td>
<td>15</td>
<td>1</td>
<td>500</td>
</tr>
<tr>
<td>13</td>
<td>Ships Name</td>
<td>2</td>
<td>20</td>
<td>32</td>
</tr>
<tr>
<td>14</td>
<td>Open Deck Area Aft.</td>
<td>34</td>
<td>2</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9</td>
<td>2</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td></td>
<td>13</td>
<td>1</td>
<td>13</td>
</tr>
<tr>
<td>14</td>
<td>Open Deck Area Fwd.</td>
<td>52</td>
<td>1</td>
<td>13</td>
</tr>
<tr>
<td>15</td>
<td>Funnel Light NCLA Logo</td>
<td>2</td>
<td>20</td>
<td>32</td>
</tr>
<tr>
<td>15</td>
<td>Helicopter Pick Up Area</td>
<td>8</td>
<td>1</td>
<td>500</td>
</tr>
<tr>
<td></td>
<td></td>
<td>26</td>
<td>1</td>
<td>13</td>
</tr>
<tr>
<td>12-15+</td>
<td>Festival Light Aft. (String Lights)</td>
<td>1</td>
<td>67</td>
<td>25</td>
</tr>
<tr>
<td>15+</td>
<td>Festival Light Midship. (String Lights)</td>
<td>1</td>
<td>106</td>
<td>25</td>
</tr>
<tr>
<td>12-15+</td>
<td>Festival Light Fwd. (String Lights)</td>
<td>1</td>
<td>44</td>
<td>25</td>
</tr>
</tbody>
</table>

Exterior Lights Illuminated During the Shearwater Fledging Season

<table>
<thead>
<tr>
<th>Location</th>
<th>Description</th>
<th># Bulbs</th>
<th>Wattage</th>
<th>Switch</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Open Deck Promenade Evacuation Deck</td>
<td>146</td>
<td>2</td>
<td>32</td>
</tr>
<tr>
<td>11</td>
<td>Spotlight Showers</td>
<td>2</td>
<td>1</td>
<td>50</td>
</tr>
<tr>
<td>12</td>
<td>Pool Aft. - Sun &amp; Passenger Deck</td>
<td>85</td>
<td>1</td>
<td>13</td>
</tr>
<tr>
<td>13</td>
<td>Bar &amp; Sports Area Deck Aft.</td>
<td>52</td>
<td>1</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td></td>
<td>24</td>
<td>1</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6</td>
<td>2</td>
<td>60</td>
</tr>
<tr>
<td>13</td>
<td>Open &amp; Viewing Deck Fwd.</td>
<td>54</td>
<td>1</td>
<td>13</td>
</tr>
<tr>
<td>14</td>
<td></td>
<td>14</td>
<td>1</td>
<td>50</td>
</tr>
<tr>
<td>Minimization Measures Considered</td>
<td>Feasible? (Y / N)</td>
<td>If not Feasible to Implement Measures, Provide Reason</td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------------------------</td>
<td>------------------</td>
<td>-----------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>▪ Change time of light use (lights off earlier)</td>
<td>Yes / NO</td>
<td>Not practicable aboard a moving vessel due to safety and security concerns</td>
<td></td>
<td></td>
</tr>
<tr>
<td>▪ Deactivate unnecessary lights</td>
<td>YES / No</td>
<td>This has been done to the extent that the US Coast Guard and SOLAS regulations allow</td>
<td></td>
<td></td>
</tr>
<tr>
<td>▪ Replace all outdoor lights with full cut-off fixtures</td>
<td>YES / No</td>
<td>This has been done to the extent that the US Coast Guard and SOLAS regulations allow</td>
<td></td>
<td></td>
</tr>
<tr>
<td>▪ Shield all outdoor lights with full cut-off shields</td>
<td>YES / No</td>
<td>This has been done to the extent that the US Coast Guard and SOLAS regulations allow</td>
<td></td>
<td></td>
</tr>
<tr>
<td>▪ Angle all lights downward</td>
<td>YES / No</td>
<td>This has been done to the extent that the US Coast Guard and SOLAS regulations allow</td>
<td></td>
<td></td>
</tr>
<tr>
<td>▪ Lower intensity (lumens) of outdoor lights</td>
<td>YES / No</td>
<td>This has been done extensively in all outdoor areas on board the vessel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>▪ Change bulb color to non-white spectrum</td>
<td>YES / No</td>
<td>This has been done extensively in all outdoor areas on board the vessel. Most of the exterior lights on the upper decks and around the pool have been changed to blue bulbs or blue coated lamp covers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>▪ Prohibit/control unleashed predatory animals; prohibit outdoor feeding of animals; require sealed rubbish containers</td>
<td>YES / No</td>
<td>Not applicable on an ocean going ship</td>
<td></td>
<td></td>
</tr>
<tr>
<td>▪ Provide Worker Seabird Awareness Training to staff</td>
<td>YES / NO</td>
<td>All crewmembers are required to complete Seabird Awareness Training prior to their assumption of duties on each tour of duty</td>
<td></td>
<td></td>
</tr>
<tr>
<td>▪ Provide outreach materials to staff &amp; guests</td>
<td>YES / NO</td>
<td>During the seabird season printed outreach material is placed in every cabin and is posted in all crewmember areas of the vessel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>▪ Host Save Our Shearwaters (SOS) Aid Station</td>
<td>Yes / NO</td>
<td>Not applicable on an ocean going ship – there is a SOS Aid Station at the harbor where any downed birds are placed</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Item 8. Minimization Plans. Provide a plan to minimize the effects to the Covered Seabirds due to the Covered Activities. KSHCP Participants will be required to minimize the effects of the Covered Activities to the “maximum extent practicable” per applicable state and federal laws which regulate take license/permit issuance. The KSHCP document provides minimization objectives and measures to follow.

The Minimization Plans should include the proposed minimization measures, timeline, and estimated cost for each facility. In this item, the Participant can include measures already completed or in place (new lights, shields, operational changes). Timeline should include estimated completion schedule, and annual schedule for minimization that will occur only during fledging season.

Minimization measures not yet determined but anticipated to occur at the facility; this section should include an estimated cost that will be earmarked for future minimization measures.

If applicable, the participant must provide the reasoning why certain measures will not be implemented. The suggested table below may each be altered to best describe the Minimization Plan. Attach additional pages, photos, and drawings as needed.

The lights that were modified on the ship were identified by conducting annual surveys of the ship with the NCL biologist, accompanied by the Director of Environmental Compliance from the Florida home office, along with the on board environmental officer. These surveys are repeated every year prior to the onset of the seabird season typical on Kauai, and typically during August. Any needed modifications to the lighting regime are identified by the biologist prior to the season, and implemented prior to September 1 each year. The NCL biologist routinely conducts site visits of the ship when it is moored in Kauai during the seabird season to ensure that all of the in season lighting minimization measures are being complied with. Please also see items 6 and 7 above and 9 below.
Table 6: Lighting Minimization Measures

<table>
<thead>
<tr>
<th>List of Buildings</th>
<th>Minimization Measures</th>
<th>Cost to Implement</th>
<th>Responsible Staff</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
## Table 7: Seabird Mortality Minimization Plan

<table>
<thead>
<tr>
<th>Minimization Measures</th>
<th>Describe minimization method (e.g. trapping, outreach, enact policy)</th>
<th>Cost to Implement</th>
<th>Responsible Staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remove &amp; control loose predatory animals at the facility. (Loose animals can kill grounded seabirds and this measure aims to prevent seabird mortality by animals.)</td>
<td>Not applicable on a seagoing vessel</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Prohibit outdoor feeding of predatory animals. (feeding animals attracts them to the site and this measure aims to reduce the presence of animals that can cause seabird mortality.)</td>
<td>Not applicable on a seagoing vessel</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Conduct nightly/morning searches to recover downed birds at the property &amp; turn them into SOS following protocols (see monitoring plan below).</td>
<td>See Table 8 and Item 9 below</td>
<td>N/A</td>
<td>Environmental officer and all crewmembers</td>
</tr>
<tr>
<td>Train staff to follow minimization measures.</td>
<td>See item 11 below</td>
<td>N/A</td>
<td>Environmental officer</td>
</tr>
</tbody>
</table>

KSHCP-PIP NCL
14
Item 9. Take Monitoring Plan. Provide a plan to monitor take of the Covered Seabirds at the facilities proposed to be covered by the incidental take permit/license. The take monitoring plan describes how the property will be searched for downed Covered Seabirds. The KSHCP document provides standards and guidelines for take monitoring to ensure that take of the species is accurately measured and recorded.

The regulatory agencies will make the final determination as to the adequacy of the take monitoring plan.

The onboard Environmental Officer is responsible for overseeing the seabird protocols, bird searches and recovery, record keeping, and interaction with the Save our Shearwater Program (SOS) on Kaua‘i and with biologists from the State Department of Land and Natural Resources, Division of Forestry and Wildlife on O‘ahu, Maui and Hawai‘i. All crewmembers are responsible for searching their respective duty stations for downed seabirds on a daily basis. Seabird monitoring covers 100 percent of the ship that is accessible to crew members and passengers. A copy of the current seabird protocols is attached as Appendix E.

The Environmental Officer maintains a log of all seabirds recovered on the vessel. A typical log is attached as Appendix F. The Environmental Officer is also responsible for ensuring that photographs are taken of every bird recovered on the ship, and is also required to transmit copies of the photographs and updated log sheet to both the NCL America Manager of Environmental & Regulatory Compliance, and NCL’s seabird consultant on a weekly basis for review. Current seabird photography guidelines are attached as Appendix G.

As in previous years, a lighting review will be conducted by NCL’s seabird consultant and the onboard Environmental Officer prior to the start of the seabird season to determine if additional changes need to be made to the seabird lighting protocols. Any revised lighting protocols will be added to this document when and if they are deemed necessary. Additionally, NCL’s ISM audit team shall review the light plan and will also audit the seabird policy prior to the start of the seabird fallout season to ensure that all onboard preparations are ready and that the ship is in compliance with NCL’s seabird policy.
## Table 8: Covered Seabird Take Monitoring Protocols

<table>
<thead>
<tr>
<th>Item</th>
<th>Protocol (fill in protocol &amp; provide reasons)</th>
<th>KSHCP Guideline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage of the total property that will be searched &amp; the total area to be searched</td>
<td>See above (“Seabird monitoring covers 100 percent of the ship that is accessible to crew members and passengers”) and Appendix E.</td>
<td>Search as much area as possible</td>
</tr>
<tr>
<td>Frequency of searches (# per day or per week)</td>
<td>Continuous searches through each day (see above)</td>
<td>Twice daily</td>
</tr>
<tr>
<td>Time of day of searches</td>
<td>Crewmembers monitor their respective duty stations throughout their shift providing 24/7 coverage every day of the year</td>
<td>2-3 hours after sunset, and within 3 hours after sunrise</td>
</tr>
<tr>
<td>Number of searchers per search area</td>
<td>Crewmembers are responsible for searching their respective duty stations. There are approximately 900 crew members</td>
<td>Depends on site conditions and safety considerations and vegetation, nearby hazards/threats</td>
</tr>
<tr>
<td>Proposed training</td>
<td>A copy of the current seabird protocols is attached as Appendix E.</td>
<td>Annual training covering seabird identification, seabird handling, response procedures, verified and documented</td>
</tr>
</tbody>
</table>
Item 10. Components of the Green Sea Turtle Minimization and Monitoring Plan (if required). Monitoring and minimization for the Green Sea Turtle is in two parts: A) Monitoring to detect nests and B) Monitoring and minimizing impacts to nests detected.

Part A: Monitoring to detect Green Sea Turtle Nests
Please provide the following information; the table below may be used and altered as needed.

1) Detailed location and description of beaches, including linear distance, at which searching for nests of the green sea turtle will take place. Searches should take place at any beach from which light at the facility can be viewed;

2) Monitoring protocols indicating:
   a) Annual training of searchers;
   b) Frequency of searches;
   c) Conduct active searching (searching the beach width);
   d) Sufficient number of trained searchers to cover the area; and
   e) Record results of search monitoring.

3) All Participants are required to record the results of search efforts. Records should provide:
   a) Evidence (what was seen). Include description and provide photographs
   b) Location on the beach (GPS) and physically mark the location if possible
   c) Date and time of day
   d) Description of surrounding land use (e.g., vacant, or developed), and
   e) Proximity to the facility.

Part B: Monitoring of Identified Green Sea Turtle Nests
Each identified nest of the green sea turtle should be monitored and protected from light attraction. Please provide the following monitoring protocols; the tables below may be used and altered as needed.

1. Light avoidance measure for identified nests (either shield/deactivate lights at the facility or install and maintain a light shield around each identified nest);
2. Frequency of searches;
3. Number of searches monitoring the nests. The number of needed to monitor active nests will depend on number of nests identified and amount of beach needed to be covered;
4. Record the results of nest monitoring. Monitoring should provide:
   a. Evidence of hatchling emergence (description and photos):
   b. Date and time of emergence,
   c. Direction of tracks
   d. Condition of the nest area (e.g., disturbed or not).
<table>
<thead>
<tr>
<th>Item</th>
<th>Protocol (fill in protocol &amp; provide reasons)</th>
<th>KSHCP Guideline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location &amp; description of the beach, or beaches, surveyed and the linear distance of the beach.</td>
<td>N/A</td>
<td>Beach area surveyed should coincide with visibility from the facility with the lights.</td>
</tr>
<tr>
<td>Frequency of searches (# per day or per week)</td>
<td>N/A</td>
<td>Weekly during nesting season (typ. May 15 to end of August)</td>
</tr>
<tr>
<td>Number of searchers per search area</td>
<td>N/A</td>
<td>Depends on site conditions and safety considerations</td>
</tr>
<tr>
<td>Proposed training</td>
<td>N/A</td>
<td>Searchers should receive annual training conducted by the DLNR or the USFWS, or their designee. See item 9a.</td>
</tr>
</tbody>
</table>
Table 10: Green Sea Turtle Monitoring Protocols – Part B: Monitoring of Identified Nests & Minimization

<table>
<thead>
<tr>
<th>Item</th>
<th>Protocol (fill in protocol &amp; provide reasons)</th>
<th>KSHCP Guideline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency of checks (# per day or per week)</td>
<td>N/A</td>
<td>Active nests should be monitored every 1-2 days; then daily during expected hatching date</td>
</tr>
<tr>
<td>Light avoidance</td>
<td>N/A</td>
<td>If lights cannot be deactivated or shielded from the nest, each nest should be screened from visible light.</td>
</tr>
<tr>
<td>Number of searchers per search area</td>
<td>N/A</td>
<td>Depends on site conditions and safety considerations</td>
</tr>
</tbody>
</table>


Item 11. Describe the schedule that will be followed to provide training for staff. Training must be provided to those that will conduct and oversee the searches at the facility.

The training should include:

1. Summary of regulations protecting the Covered Species;
2. Search procedures, route, frequency and timing specific to the facility’s monitoring plan, for seabirds and green sea turtle nests (if applicable);
3. Response procedures including safe and proper techniques for handling seabirds;
4. Recognizing evidence of green sea turtle nests, proper nest light screening, and hatchling activity (if green sea turtle minimization and monitoring plan is applicable);
5. Procedures to document the results of searches;
6. Downed wildlife agency contacts; and
7. Nearest SOS aid station.

Rescuing Downed Seabirds—Standard Operating Procedures (SOP)

The following steps provide the procedure for recovering downed seabirds found:

1. Take the seabird recovery kit and pet carrier to the downed seabird.
2. Put on gloves.
3. Using towel to gently cover the bird, pick up the seabird.
4. Place the seabird in the pet carrier, and close the pet carrier.
5. Put the gloves and towel back in the seabird rescue kit.
6. Take the bird and pet carrier to an SOS Aid Station.
7. Transfer the bird to the Aid Station’s pet carrier.
8. Call SOS at 632-0610 or 635-5117.
9. Return the seabird rescue kit and pet carrier.
11. Give the completed “Bird Take Field Report” to the General Manager, or other responsible staff person at the facility.

Contents of Seabird Recovery Kit

1. Latex or nitrile gloves;
2. Three towels;
3. Hand sanitizer;
4. Flashlight or headlamp;
5. Clipboard, pen and blank “Bird Take Field Reports”, or similar; and
6. Pet carrier—medium sized. If a box is used it must be well ventilated and marked conspicuously “LIVE ANIMAL”.

KSHCP-PIP NCL
20
Seabird Awareness Training

A seabird awareness training program is conducted for all crewmembers from the Captain down to the cabin stewards once a year just prior to the start of the seabird seasons. If crew members join the ship for their tour of duty during the seabird season they are given the seabird awareness training prior to them being allowed to take up their duty station. It is an employment requirement that all employees undergo the training program once a year, or at the start of their tour of duty. The Seabird Awareness Training Program is an integrated part of the NCL Safety and Environmental Management System, which in practice means that Seabird Awareness Training is as considered as important as fire fighting, oil spill response or lifeboat training.

Synopsis of the NCLA/NCL Onboard Seabird Awareness Training Program:

The PowerPoint presentation attached as Appendix D includes slides detailing and defining seabird light attraction issues. It also contains slides identifying:

- Agency and Seabird Program Contacts
- Slides illustrating both threatened and endangered seabird species as well as the more commonly occurring species protected under the federal MBTA.
- Regulatory framework, both federal and state
- Definitions of “take”
- Penalties for non-compliance
- Seabird season lighting rules and protocols
- Seabird handling procedures and protocols

The training module is revised each year prior to the start of the seabird season incorporating any needed changes to the program identified during the previous season’s activities. Copies of the current version of the PowerPoint slides used in this training program are provided in Appendix D, additionally, NCL’s seabird consultant re-trains the onboard Environmental Officer just prior to the start of the seabird season each year.
Item 12. Describe any outreach conducted (e.g., handing out pamphlets on seabird awareness to facility employees or guests,):

Guest Outreach

During the seabird season, The Pride of America provides information on seabirds, and seabird protocols to its passengers in the “Free Style Daily,” the ship’s onboard daily newspaper. Typical seabird information provided to guests in the Free Style Daily is attached as Appendix H. The ship’s hotel staff closes cabin draperies each afternoon as part of the turn-down service (NCL Housekeeping Policy (HK), 03.28 and HD .03.80 11/30/2006 and 11/2009 respectively). Additionally, when cabins are cleaned, draperies are also closed. Passengers are requested to keep their draperies closed as part of the ship’s green initiative and to conserve natural resources.
PART 2. Take Estimate, Requested Amount of Take Authorization, and Funding

Item 1. Show the calculation of estimated take for each of the Covered Species.

Following the take estimation methods in the KSHCP for estimating a Participant’s take, the tables and charts below show the take estimate calculation for the facility for each of the Covered Seabirds.

The KSHCP take estimate method utilizes the average of the most recent 5 years of SOS recovery data for the facility. Applied to the data is an adjustment for downed birds not found, assumed at 50 percent.

If the landowner-applicant submits a take estimate with an alternate discovery rate, they must provide the reasons why an alternate rate was used to estimate take, including relevant information supporting their reasoning.

We have used the numbers generating by the SOS program, and verified through our own database to determine take. We have determined that we have a 100% searcher efficiency rate since every deck of the ship is walked constantly 24/7 365 days a year, and even a cigarette butt is found rapidly. Not to mention that we have a crew of approximately 960 people on board at any given time, and usually over a 1000 passages in what ultimately is a confined and limiting space. All crewmembers are required to search their duty stations while they are on shift.

Table 11: Annual Take Estimate Calculation

<table>
<thead>
<tr>
<th></th>
<th>Newell’s Shearwater</th>
<th>Hawaiian Petrel</th>
<th>Band-rumped Storm-Petrel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avg. from SOS data—or—monitoring data (5 most recent yrs. = 2012-2016)</td>
<td>0</td>
<td>_</td>
<td>_</td>
</tr>
<tr>
<td>Avg. from SOS data—or—monitoring data (15 most recent yrs. =2002-2016)</td>
<td>_</td>
<td>0.07</td>
<td>0.13</td>
</tr>
<tr>
<td>Avg. lethal take estimate — SOS DATA</td>
<td>0</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Adjustment for unobserved take (0% not searchable vs 50% typical)</td>
<td>0</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Total annual lethal take from light attraction</td>
<td>0</td>
<td>0.00</td>
<td>0</td>
</tr>
<tr>
<td>Requested Annual Take</td>
<td>(1 every year)</td>
<td>0.2 (1 every five years)</td>
<td>0.2 (1 every five years)</td>
</tr>
<tr>
<td>Requested Take Over Permit Term</td>
<td>30</td>
<td>6</td>
<td>6</td>
</tr>
</tbody>
</table>
Item 2. Select the requested take authorization and permit/license term coverage for each of the Covered Species.

**Table 12: Newell’s Shearwater:**

<table>
<thead>
<tr>
<th>Age Class</th>
<th>Annual Take Estimate: Fledglings</th>
<th>Annual Take Estimate: Adults or sub-adults</th>
<th>Take Limit for License/Permit Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortality (Lethal)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Injury (Non-lethal)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 13: Hawaiian Petrel:**

<table>
<thead>
<tr>
<th>Age Class</th>
<th>Annual Take Estimate: Fledglings</th>
<th>Annual Take Estimate: Adults or sub-adults</th>
<th>Take Limit for License/Permit Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortality (Lethal)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Injury (Non-lethal)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 14: Band-rumped Storm Petrel:**

<table>
<thead>
<tr>
<th>Age Class</th>
<th>Annual Take Estimate: Fledglings</th>
<th>Annual Take Estimate: Adults or sub-adults</th>
<th>Take Limit for License/Permit Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortality (Lethal)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Injury (Non-lethal)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Item 3. Funding Assurance. Provide proof of adequate funding (see KSHCP document). All participants must demonstrate requisite funding prior to permit/license approval to ensure that the proposed measures and actions, including monitoring, will be undertaken in accordance with the terms and schedule of the KSHCP.

NCL America currently undertakes all minimization and conducts all monitoring using its existing staff as part of annual operating budget, and will continue to do so through the term of the KSHCP. NCL America will provide financial assurances as required by the KSHCP.

Signature of Participant: ________________________________

Printed Name : ________________________________ Date:___________________

The undersigned affirms that all the information included is true and accurate to the best of the participant’s knowledge and that this PIP is voluntarily submitted.

☐ check to waive confidentiality

Contact Us
Call the KSHSCP Office at (808) 245-9160 or visit our office at 4272-B Rice Street, Līhu‘e HI, 96766. Visit the project website: www.Kauai-seabirdhcp.info We look forward to working with you toward helping Hawai‘i’s unique species!
Appendices


Appendix B – Manufacturers specification sheets for exterior lighting fixtures

Appendix C – Pride of America seabird lighting protocols showing lighting changes implemented during the seabird season

Appendix D – Crew Seabird Awareness Training Program

Appendix E – Seabird Protocols

Appendix F – Typical Seabird data recovery form

Appendix G – Seabird photography guidelines

Appendix H – Typical seabird information published in the “Free Style Daily for passengers
Security measures for monitoring.
§ 104.285 Security measures for monitoring.

(a) General. (1) The vessel owner or operator must ensure the implementation of security measures and have the capability to continuously monitor, through a combination of lighting, watchkeepers, security guards, deck watches, waterborne patrols, automatic intrusion-detection devices, or surveillance equipment, as specified in their approved Vessel Security Plan (VSP), the—

(i) Vessel;

(ii) Restricted areas on board the vessel; and

(iii) Area surrounding the vessel.

(2) The following must be considered when establishing the appropriate level and location of lighting:

(i) Vessel personnel should be able to detect activities on and around the vessel, on both the shore side and the waterside;

(ii) Coverage should facilitate personnel identification at access points;

(iii) Coverage may be provided through coordination with the port or facility; and

(iv) Lighting effects, such as glare, and its impact on safety, navigation, and other security activities.

(b) Maritime Security (MARSEC) Level 1. At MARSEC Level 1, the vessel owner or operator must ensure the implementation of security measures, which may be done in coordination with a facility, to:

(1) Monitor the vessel, particularly vessel access points and restricted areas;

(2) Be able to conduct emergency searches of the vessel;

(3) Ensure that equipment or system failures or malfunctions are identified and corrected;

(4) Ensure that any automatic intrusion detection device sets off an audible or visual
alarm, or both, at a location that is continuously attended or monitored;

(5) Light deck and vessel access points during the period between sunset and sunrise and periods of limited visibility sufficiently to allow visual identification of persons seeking access to the vessel; and

(6) Use maximum available lighting while underway, during the period between sunset and sunrise, consistent with safety and international regulations.

(c) MARSEC Level 2. In addition to the security measures required for MARSEC Level 1 in this section, at MARSEC Level 2, the vessel owner or operator must also ensure the implementation of additional security measures, as specified for MARSEC Level 2 in the approved VSP. These additional security measures may include:

(1) Increasing the frequency and detail of security patrols;

(2) Increasing the coverage and intensity of lighting, alone or in coordination with the facility;

(3) Using or increasing the use of security and surveillance equipment;

(4) Assigning additional personnel as security lookouts;

(5) Coordinating with boat patrols, when provided; and

(6) Coordinating with shoreside foot or vehicle patrols, when provided.

(d) MARSEC Level 3. In addition to the security measures for MARSEC Level 1 and MARSEC Level 2, at MARSEC Level 3, the vessel owner or operator must ensure the implementation of additional security measures, as specified for MARSEC Level 3 in the approved VSP. These additional security measures may include:

(1) Cooperating with responders and facilities;

(2) Switching on all lights;

(3) Illuminating the vicinity of the vessel;

(4) Switching on all surveillance equipment capable of recording activities on, or in the vicinity of, the vessel;

(5) Maximizing the length of time such surveillance equipment can continue to record;
(6) Preparing for underwater inspection of the hull; and

(7) Initiating measures, including the slow revolution of the vessel's propellers, if practicable, to deter underwater access to the hull of the vessel.


e-CFR Data is current as of April 30, 2010
Appendix B – Manufacturers specification sheets for exterior lighting fixtures
<table>
<thead>
<tr>
<th>Part catalogue</th>
<th>Lighting Fixture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symbol no.</td>
<td>4009</td>
</tr>
<tr>
<td>Designations</td>
<td>Fluor. luminaire 2x32W, WT, SM - brackets</td>
</tr>
<tr>
<td>Part no.</td>
<td>271.192.111.7D</td>
</tr>
</tbody>
</table>

**Electrical / light specific data:**
- **Voltage:** AC 115V - 60 Hz
- **Wattage:** 3 x 32 W
- **Beam angle:** 830

**Required ballast unit:**
- **Type:** electronic
- **Electrical rating:** 72 W

**Mechanical design:**
- **Material:** Steel with outside brackets
- **Finish:** White powder coated
- **Protection:** IP 66
- **Height:** 0
- **Width:** 0
- **Depth:** 0
- **Mounting recessed:** 0
- **Reflector:** 0
- **Shade:** 0
- **Horizontal radiation angle:** 0°
- **Vertical radiation angle:** 0°

**Accessories / spare parts:**
- **Electronic ballast
- **Bulb: T8 - 32 G13 / 830**
### Part catalogue

#### Lighting Fixture

<table>
<thead>
<tr>
<th>Part no.</th>
<th>Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>4020</td>
<td>Fluor. cylindr. luminaire 1x17W, SM, PWT</td>
</tr>
</tbody>
</table>

#### Electrical data

- **Voltage**: 2AC 115V - 60Hz
- **Frequency**: 50/60 Hz
- **LED**: 3 x 2.5

#### Lamp type

<table>
<thead>
<tr>
<th>Short name</th>
<th>Amount</th>
<th>Part no.</th>
<th>Included</th>
<th>Watt</th>
<th>Socket</th>
<th>Beam angle</th>
<th>Light colour</th>
</tr>
</thead>
<tbody>
<tr>
<td>TB</td>
<td>1</td>
<td></td>
<td>✔️</td>
<td>17 W</td>
<td>G13</td>
<td></td>
<td>030</td>
</tr>
</tbody>
</table>

- **Required ballast unit**: 
  - **Type**: electronic
  - **Electrical characteristics**: 
    - **Nominal voltage**: 17V
    - **Output power**: 17W
  - **Mechanical design**: 
    - **Clear polycarbonate tube**: 1000

#### Accessories / Spare parts

- **Electronic ballast**: 17 W
- **Bulb**: TB - 17W G13 / 030
# Part catalogue

<table>
<thead>
<tr>
<th>Symbol no</th>
<th>Desig</th>
<th>Fluor. luminaire 2x32W, S/S, WT, SM - brac</th>
</tr>
</thead>
<tbody>
<tr>
<td>4024</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Electrical / light specific data

<table>
<thead>
<tr>
<th>voltage</th>
<th>frequency</th>
<th>luminaire profile</th>
<th>current</th>
<th>power</th>
<th>light intensity</th>
<th>light efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>2AC 115V</td>
<td>60 Hz</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Required ballast / unit

- Halogen
- Electronic: yes
- Luminaire: yes
- >0.9 to 1

## Technical design

- 5/5, seamless deep drawn
- White powder coated
- White powder coated
- IP 67
- 8,1
- 0
- 0
- 0

## Accessories / spare parts

<table>
<thead>
<tr>
<th>Part no</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4024</td>
<td>Electronic ballast</td>
</tr>
<tr>
<td>&gt;2</td>
<td>Bulb: T8-32W G13 / 830</td>
</tr>
</tbody>
</table>
**Part catalogue | Lighting Fixture**

**Symbol no:** 4043  
**Designation:** Fluor. luminaire 2x32W, S/S, WT, SM - bolts

**Electrical | Light specific data**

- **Voltage:** 271.192 533. TD
- **Phase:** 4043
- **AC 115V - 60 Hz**
- **Condensation:**
- **Temperature:**
- **Lamp type:**

**Short name:** T8  
**Amount:** 2  
**Part no.:**

**Included:**

- **Watt:** 32 W  
- **Socket:** G13  
- **Beam angle:** 830

**Light colour:**

- **Incandescent**
- **Halogen**
- **Fluorescent**
- **Compact fluorescent**
- **Neon**
- **LED**

**Required ballast unit:**

- **Electronic**

**Mechanical design:**

- **Material:** S/S, seamless deep drawn
- **Finish:** White powder coated

**Dimensions:**

- **Length:** 1090 [mm]
- **Width:** 1340 [mm]
- **Height:** 150 [mm]
- **Weight:** 8.1 [kg]
- **IP 67**

**Electrical:**

- **Input:** 0 [V], 0 [A]
- **Output:** Bottom: 0 [V], Top: 0 [V]
- **Max. Power:** 0 [W]

**Accessories | Spare parts:**

- **Electronic ballast**
- **Bulb:** T8 -32W G13 / 830

**Principle arrangement for decks luminaire (4043)**

**View from aft**

**Side view**

**No scale**

LUMINAIRE
**Part catalogue** | **Lighting Fixture**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>4044</td>
<td>Fluor. luminaire 2x17W, S/S, WT, SM -bolts</td>
</tr>
</tbody>
</table>

**Electrical / lighting specific data**

- **Supply voltage:** 2AC 115V - 60 Hz
- **Lighting type:** 3 x 25

**Lighting type**

<table>
<thead>
<tr>
<th>Short name</th>
<th>Amount</th>
<th>Part no.</th>
<th>Included</th>
<th>Watt</th>
<th>Socket</th>
<th>Beam angle</th>
<th>Light colour</th>
</tr>
</thead>
<tbody>
<tr>
<td>T8</td>
<td>2</td>
<td>17 W</td>
<td>613</td>
<td>830</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Incandescent
- Halogen
- Fluorescent
- Compact fluorescent
- Neon
- LED

**Required ballast unit**

- Electronic
- 2x17 W G13
- 0.9 to 1

**Mechanical design**

- S/S, seamless deep drawn
- White powder coated
- Dimensions (mm): L 724 W 155 H 128
- Weight (kg): 4.1
- Protection degree: IP 67
- Reflector: Polycarbonate, clear
- Horizontal rotation angle: 0°
- Vertical rotation angle: 0°
- Remark / options: Outside Junction box optional

**Accessories / spare parts**

- Electronic ballast
- Bulb: T8 - 17W G13 / 830
## Part catalogue | Lighting Fixture

<table>
<thead>
<tr>
<th>Symbol no.</th>
<th>Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>4062</td>
<td>Halog. floodlight 1x500 W, SM, WT</td>
</tr>
</tbody>
</table>

### Electric / light specific data

- **Voltage**: 2AC 115V - 60 Hz
- **Light source**: 3 x 2,5 Halogen
- **Beam angle**: 500 W

### Required ballast unit

- **Transformer**: n/a
- **Ballast**: n/a
- **Part no.**: >0.9 to 1
- **Color**: 500 W

### Mechanical design

- **Material**: stainless steel
- **Coating**: white powder coated
- **Dimensions (mm)**: 305 x 0 x 0
- **Weight (kg)**: 5.5

### Accessories / Spare parts

- **Bulb**: QT-DE 11/12 - 500W - R7s
**Part catalogue**

**Lighting Fixture**

<table>
<thead>
<tr>
<th>Symbol no.</th>
<th>4259</th>
</tr>
</thead>
<tbody>
<tr>
<td>Designation</td>
<td>Fluor. wall lamp 1x13W, S/S, SM</td>
</tr>
</tbody>
</table>

| Supplier | SAM Electronics |

### Electrical / Light Specific Data

- **Supply (V/D):** 230V - 60 Hz
- **Frequency:** 50 Hz
- **Cables:** 3 x 2.5 mm²

### Lamp Type

- **Short name:** TC-DEL
- **Amount:** 1
- **Part no.:**
- **Included:**
- **Wattage:** 13 W
- **Socket:** G24q-1
- **Beam angle:** 830
- **Light colour:**
  - [ ] incandescent
  - [ ] halogen
  - [ ] fluorescent
  - [x] compact fluorescent
  - [ ] Neon
  - [ ] LED

### Required Ballast

- **Electronic:**
- **Part no.:**
- **Type:**
- **Power:**
- **Connection:**
- **Input (V):** 230 V
- **Output (V):** 13 W
- **Input (A):**
- **Output (A):**
- **Power factor:**
- **Efficiency:**
- **Parameter:**
- **Current:**
- **Frequency:**
- **Duty cycle:**
- **Start in:**
- **Start out:**
- **Type:**
- **Switching frequency:**
- **Rating:**
- **Mounting:**
- **Dimensions:**
- **Weight:**
- **Protection class:**
- **Material:**
- **Finish:**

### Mechanical Design

- **Material:** stainless steel
- **Finish:** white powder coated
- **Dimensions:**
  - 247 mm x 105 mm
  - Weight: 1.8 kg
- **Protection degree:** IP 67
- **Emergency:**
- **Lighting:**
- **Colour:** halve moon white
- **Screws:**
- **Accessories:**
- **Notes:** provided for public outdoor areas as rail light

### Accessories / Spare Parts

- **Part no.:**
- **Description:**
- **Bulb:** TC-DEL -13W G24q-1
- **Deco ring:** halve moon white / polyc. Opa
# Part catalogue | Lighting Fixture

<table>
<thead>
<tr>
<th>Symbol No.</th>
<th>Designation</th>
<th>Halogen, flood light adj. 1x50W/60°, SM</th>
</tr>
</thead>
<tbody>
<tr>
<td>9265</td>
<td></td>
<td></td>
</tr>
<tr>
<td>271.192 766. TD</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Technical Data**

- **Power Input:** 2AC 115V - 60 Hz
- **Luminaire Angle:** 3 x 30°
- **Lamp Type:** 3 x 50W

<table>
<thead>
<tr>
<th>Short Name</th>
<th>Part No.</th>
<th>Included</th>
<th>Watt</th>
<th>Socket</th>
<th>Beam Angle</th>
<th>Colour</th>
</tr>
</thead>
<tbody>
<tr>
<td>QT-ax12/c</td>
<td>1</td>
<td>✓</td>
<td>50 W</td>
<td>GY 6.35</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Incandescent: ✓ Halogen: ✓ Fluorescent: × Compact Fluorescent: × Neon: × LED: ×

**Mechanical Design**

- **Material:** Aluminium: white powder coated
- **Dimensions:** Width: D: 120 mm, H: 60 mm, E: 150 mm, W: 0, Weight: 2 Kg
- **Protection/IP Rating:** IP 67
- **Accessories:** Aluminium polished, Diffuser: clear glass
- **Additional Information:** Provided for public exterior areas, Deck 11 as wall washer

**Accessories/Spares Parts**

- Bulb: QTLP-ax12/c 50W IRC
<table>
<thead>
<tr>
<th>Symbol No.</th>
<th>Part No.</th>
<th>Designation</th>
<th>Electrical / Light Specific Data</th>
<th>Mechanical Design</th>
</tr>
</thead>
<tbody>
<tr>
<td>4267</td>
<td>271.192 739, TD</td>
<td>Incand. decor. post lamp 2x40W, S/S 300m</td>
<td>Symbol No. 271.192 739, TD</td>
<td>Frame: Stainless steel</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Lamp Type: A 60 clear</td>
<td>Dimensions (mm): L: 0 D: 0 H: 0 W: 0 40W E26 IP 55</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>watt: 40 W</td>
<td>Beam Angle: &gt;0,9 to 1</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Included: Yes</td>
<td>Light Colour: A 60 clear</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Beam Angle: &gt;0,9 to 1</td>
<td>Mechanical Design: Stainless Steel</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Light Colour: A 60 clear</td>
<td>Provided for public exterior area Deck 13 MF31, 9 pcs. 2 long arms, Globe dia. 300 mm</td>
</tr>
</tbody>
</table>

- Bulb: A60 clear -40W E26
<table>
<thead>
<tr>
<th>Part catalogue</th>
<th>Lighting Fixture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symbol No.</td>
<td>4272</td>
</tr>
<tr>
<td>Designation</td>
<td>Halog. flood light adj. 1x50W/21°, SM</td>
</tr>
</tbody>
</table>

- **AC 115V - 60 Hz**
- **Wattage:** 50 W
- **Color:** GY 6,35

- **Beam Angle:** 90°
- **Light Source:** Halogen

- **Mechanical Design:**
  - **Material:** Aluminum
  - **Finish:** White powder coated
  - **Protection:** IP 67

- **Parts:**
  - **Aluminum polished**
  - **Clear glass**
  - **Bulb:** QTL-P-ax12/c 50W IRC

- **Accessories:**
  - Provided for public exterior areas. Deck 11 as wall washer
Appendix C – Pride of America seabird lighting protocols showing lighting changes implemented during the seabird season
Pride of America
Deck 12
Basket Ball court Deck 14,
Informing Our Guests

Free Style Daily

From September – December, Hawaii’s protected seabirds; fledglings will be taking flight into Open Ocean. As a precautionary measure, the Pride of America will be reducing its lighting on its open decks, to prevent the birds from flying into the vessel and sustaining any injuries. NCL is committed to making every effort to ensure that Hawaii’s wildlife and environment are protected and cared for.” Should you find an injured bird please call our Reception desk telephone # 0.”
Freestyle Daily

Pride of Aloha
Saturday, September 1, 2007

Today's Highlights:

- 12:30pm: Aloha Bar & Nightclub
- 5:00pm: Aloha Bar & Nightclub

Bar Services:
- Cagney's Bar
- Aloha Bar
- Aloha Bar & Nightclub

Guest Services:
- Reception Desk
- Guest Services

Special Events:
- Hawaiian Luau

Tonight's Entertainment:

Tonight's entertainment will be on a stage in the Stardust Variety Show. Please join us for the Stardust Variety Show, as we present a variety of acts for your enjoyment.

What's on tap today:

- Aloha Bar & Nightclub
- Aloha Bar & Nightclub

Special Events:
- Hawaiian Luau

Don't miss this:

Special Events:
- Hawaiian Luau

Upcoming Events:
- Hawaiian Luau

Tips of the day:

- Today's Highlights
- Today's Highlights

We hope you enjoy your time with us on board today and look forward to seeing you tomorrow.

Beautiful morning!

- Aloha Bar & Nightclub
- Aloha Bar & Nightclub

Tips of the day:

- Today's Highlights
- Today's Highlights

We hope you enjoy your time with us on board today and look forward to seeing you tomorrow.

Beautiful morning!

- Aloha Bar & Nightclub
- Aloha Bar & Nightclub

Tips of the day:

- Today's Highlights
- Today's Highlights

We hope you enjoy your time with us on board today and look forward to seeing you tomorrow.

Beautiful morning!

- Aloha Bar & Nightclub
- Aloha Bar & Nightclub

Tips of the day:

- Today's Highlights
- Today's Highlights

We hope you enjoy your time with us on board today and look forward to seeing you tomorrow.

Beautiful morning!

- Aloha Bar & Nightclub
- Aloha Bar & Nightclub

Tips of the day:

- Today's Highlights
- Today's Highlights

We hope you enjoy your time with us on board today and look forward to seeing you tomorrow.

Beautiful morning!
Appendix D – Crew Seabird Awareness Training Program
Seabird Awareness Training Program
Purpose of Training

- Several protected species of seabirds have come aboard our ships
- Norwegian is committed to the protection of these species
- Norwegian has specific seabird protocols in place that will be followed
- All crew members need to be familiar with the issues and protocols
- There are significant legal implications if these birds are harmed, or protocols are not followed
Outline

• Agency and Seabird Program Contacts
• Threatened and endangered seabird species
• Regulatory framework: State and Federal
• Definition of “Take”
• Penalties for non-compliance
• Seabird season lighting rules
• Seabird handling procedures & protocols
Threatened & Endangered Seabirds

Newell’s Shearwater

- Hawaiian Petrel
- Band-rumped Storm-Petrel
Other Seabirds

White-tailed Tropicbird

Wedge-tailed Shearwater

Sooty Tern
Hawaiian Petrel - ‘u‘au

- Listed as Endangered by both U.S. & State of Hawaii
- Breeding populations on Kaua‘i, Maui, Lana‘i and Hawai‘i
- The Hawaiian Petrel, has a dark gray head, wings, and tail, and a white forehead and belly. It has a stout grayish-black bill that is hooked at the tip, legs are pinkish, with black and pink feet. This bird measures 16-17 inches in length and has a wing span of 35-37 inches.
Newell’s Shearwater - ‘a‘o

- Listed as a threatened species by both the U.S. and State of Hawai‘i
- 80% world’s population nests on Kaua‘i
- Also breeds on Maui, Hawai‘i and possibly Moloka‘i
- The Newell’s Shearwater has an almost black head, upper wings and tail, and is white below. It has a thin narrow bill. Legs and feet are grey/black. Newell’s are 12-14-inches long, and has a wingspan of 30-inches
Band-rumped Storm-Petrel - ‘ake‘ake

- Listed as an endangered species State of Hawai‘i
- Breeds on Kaua‘i, Maui, and Hawai‘i
- The Band-rumped Storm-Petrel is a very small, sparrow sized seabird. It is sooty/grey brown, with a white band circling the upper tail. It has a very small stubby beak with prominent tube on the top. Legs, feet and bill are black. They are 7-8 inches long, with a wingspan of 12-16-inches.
Lights, Vessels and Seabirds

- Nocturnally flying seabirds are often attracted to lights.
- Fledgling birds on their way to sea for the first time are often attracted to lights, and can be confused by them.
- Confused birds may collide with structures, including vessels, or simply land on the ground, or ship to tired to continue flying.
- Once on the ground they cannot take off again, and will die from starvation, or be killed by predators if not rescued.
- Some seabirds land on vessels naturally and do not need assistance.
Regulatory Setting, Protected Species

Federal -
The endangered species act of 1973, as amended (ESA)
Migratory Bird Treaty Act (MBTA)

State of Hawaiʻi -

Hawaii Revised Statutes (Section 195-D)

**IT IS ILLEGAL TO:**

“harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.” any species listed under any of these statutes
Take Home Message

• The downing of listed seabirds as a result of interactions with lights and man-made structures may be construed as “take” under the ESA, and/or HRS 195D.

• The minimization and avoidance of “take” to the maximum extent practicable is required under both federal and State of Hawaii endangered species statutes.

• Failure to do so may result in enforcement action, which may result in significant civil and criminal penalties.

• Penalties include civil fines of up to $25,000 per incident, and criminal fines of up to $50,000, and up to one year federal imprisonment per incident.
Seabird Season Lighting Protocols

- Between September 1 and December 15, The Pride of America will implement a light reduction plan (Seabird Seasonal Lighting Plan)
- Vessels will turn off lights identified in that plan while in port
- The reason for the reduced lighting while in port is to minimize the chance that seabirds will be attracted to the lights, become disoriented by them, and then collide with the ship or associated dock facilities
Downed Seabird Search Protocols

- We will inspect all open and semi open decks after sunrise and after sunset each day looking for seabirds that have landed.
- Downed seabirds often try to hide, make sure to check under any object that a bird might be able to hide under.
- All crew members should also be aware of downed seabirds on the vessel, and report any such birds to the Environmental Officer immediately.
- (DO NOT touch or approach the bird)
- Passengers should report any downed birds to reception. Reception will forward information of downed seabird immediately to the Environmental Officer.
Downed Seabird Handling Protocols

- All downed birds will be collected by the Environmental Officer
- All birds will be handled in accordance with SEMS G715.03.1 (Norwegian and NCL America Sea Bird Protection Policy)
- Data and photographs of all downed seabirds will be collected as detailed on the G715.03.1 (Norwegian and NCL America Sea Bird Protection Policy)
- All downed birds that do not fly off the ship unaided will be turned over to the appropriate wildlife agency personnel
Parting Message

- Norwegian thanks you for your attention to, and assistance with this program
- Norwegian takes pride in our continued efforts to protect our oceans and the islands which we visit
- For further information please contact the Environmental Officer at 8815
Agency and Seabird Program Contacts

• State Dept. Land & Natural Resources
  Thomas Kaiakapu: Wildlife Manager (808) 274-3440

• Save Our Shearwaters (SOS) Coordinator
  Tracy Anderson (808) 635-5117

• Norwegian - Environmental and Regulatory Compliance Manager
  Sarah Brown-Ferguson (305) 436-4349  Cell: (305) 496-5714
  RWilkinson@ncl.com

• Norwegian - Seabird Program Biologist
  Reginald David Cell (808) 937-0124, (808) 329-9141
  rdavid@kona.net
Thank You!

Be Safe and Environmentally Friendly!
Appendix E – Seabird Protocols
SCOPE – The protection of Seabirds that come aboard our vessels and to ensure the safe return of these Seabirds to their Natural Habitat

Overview:

The Hawaiian Islands have many Seabirds that are protected under federal and State of Hawaii endangered species statutes. NCL has developed the Following procedures as part of our Commitment to the Protection of these Endangered species.

Some of these Seabirds include but are not limited to:
Hawaiian Petrel
Newell’s Shearwater
Band-rumped Storm-Petrel

- Nocturnally flying seabirds are often attracted to lights
- Fledgling birds on their way to sea for the first time are often attracted to lights, and can be confused by them
- Confused birds may collide with structures, i.e. vessels, or simply land on the ground, or a ship to tired to continue flying
- Once on the ground they cannot take off again, and will die from starvation, or be killed by predators if not rescued

The Federal - The endangered species act of 1973, as amended (ESA)
Migratory Bird Treaty Act (MBTA)
State of Hawai‘i -
Hawaii Revised Statutes (Section 195-D)

The downing of listed seabirds as a result of interactions with lights and man-made structures may be construed as “take” under the ESA, and/or HRS 195D. The minimization and avoidance of “take” to the maximum extent practicable is required under both federal and State of Hawaii endangered species statutes.

Procedures:

NCL/NCLA Vessels operating in and around the Islands of Hawaii will during the Shearwater fledging season will reduce its lighting to a maximum extent without endangering the safety or welfare of the Vessel or its passengers and crew.

Crews working on open decks are to inspect their areas of work for “Downed seabirds” paying particular attention to the early morning hours and just prior to sunrise and the late evening hours just after sunset. These birds will try to find hiding places one MUST look under and behind furniture and other objects that may provide good hiding places for injured/scared birds.
Protected Seabirds (Hawaii Specific)

All birds that are located are NOT to be handled or threatened in any way; IMMEDIATE notification must be made to the Environmental Officer. He/she will, collect the Downed seabird and place into a clean and sanitary “Pet carrier” for safe keeping (In a dark quite location) until arrangements have been completed for handing over of the Seabird to a State of Hawaii Division of Forestry and Wildlife agent, or in the case of Kauai to the Save Our Shearwaters program. When a Seabird is handed over to an appropriate entity, the Environmental Officer must document who collected, and which agency or program collected the bird, or if the bird was left in the ports seabird rescue holding units, as well as who was notified that a bird has been left for collection and the time that said notification was made.

Any Hawaiian Petrel, Newell’s Shearwaters or Band-rumped Storm-Petrels that are recovered dead, or die while in the care of the Environmental Officer shall be double bagged in Ziploc style freezer bags with the details of where the bird was found and any log reference numbers, and frozen until the ship docks in Nawiliwili on Kauai. At that time the Environmental Officer shall contact the Save Our Shearwater Program Coordinator, Angie Merritt at (808) 635-5117 for pickup. When in doubt as to the correct identification of the dead seabird handle as if it were one of the three listed species identified above.

Guests are to be informed of the reduction in lighting by means of the Free Style Daily: Example for Freestyle Daily.

“From September – December, Hawaii’s protected seabirds; fledglings will be taking flight into the Open Ocean. As a precautionary measure, The Pride of America will be reducing its lighting on its open decks, to prevent the birds from flying into the vessel and sustaining any injuries. NCL is committed to making every effort to ensure that Hawaii’s wildlife and environment are protected and cared for.” Should you find an injured bird please call our Reception desk telephone # 0.

Reception will upon being notified of a downed Seabird by a guest shall IMMEDIATELY notify the Environmental Officer for collection and documentation.

Training:

Per the F541 Training Matrix the E-SHEAR shearwater training shall be conducted for every crew member onboard the vessel and documented in MAPS. Training shall commence two weeks prior to the Season opening date, and will continue for all crew and Officers joining during the season. The training must be given yearly.

Documentation:

Documenting each and every downed seabird is extremely important, and MUST be clear with precise location descriptions of where the Downed seabird was collected from.

Example: Fig 1
Documenting the Downed Seabird must include a set of clear Photographs to aid in the identification of it to species. Photographs are to be sent directly to Mgr Environmental and Regulatory Compliance Rwilkinson@ncl.com and NCL’s Seabird Program Biologist rdavid@ilhawaii.net

Photographs of the seabirds must to the best extent possible follow the examples provided to the Environmental Officer. Photograph files, must be named in conjunction with the reference on the Log sheet. As per example Fig 1

The Seabird Season Log is to be filled in on a daily basis and submitted weekly to the Manger Environmental and Regulatory Compliance for review.

Reference:
Pride of America Light Reduction Plan.
Seabird Log
Seabird Photography Guidelines
Seabird Rescue Contact List
F541 E-SHEAR Training.

For further information and questions please contact Rwilkinson@ncl.com Manager Environmental and Regulatory Compliance
Appendix F – Typical Seabird data recovery form
### Seabird Data Log

<table>
<thead>
<tr>
<th>Date</th>
<th>Reference</th>
<th>Time</th>
<th>Location or Cabin #</th>
<th>Species</th>
<th>Ship Location Latitude</th>
<th>Ship Location Longitude</th>
<th>Agency or SOS contacted</th>
<th>Time Contact Made / pickup</th>
<th>Pier-side SOS Aid Station</th>
<th>Remarks</th>
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</thead>
<tbody>
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</tbody>
</table>
Appendix G– Seabird photography guidelines
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All birds that are located are NOT to be handled or threatened in any way; **IMMEDIATE** notification must be made to the Environmental Officer. He/she will, collect the Downed seabird and place into a clean and sanitary “Pet carrier” for safe keeping (In a dark quite location) until arrangements have been completed for handing over of the Seabird to a State of Hawaii Division of Forestry and Wildlife agent, or in the case of Kauai to the Save Our Shearwaters program. When a Seabird is handed over to an appropriate entity, the Environmental Officer must document who collected, and which agency or program collected the bird, or if the bird was left in the ports seabird rescue holding units, as well as who was notified that a bird has been left for collection and the time that said notification was made.

Any Hawaiian Petrel, Newell’s Shearwaters or Band-rumped Storm-Petrels that are recovered dead, or die while in the care of the Environmental Officer shall be double bagged in Ziploc style freezer bags with the details of where the bird was found and any log reference numbers, and frozen until the ship docks in Nawiliwili on Kauai. At that time the Environmental Officer shall contact the Save Our Shearwater Program Coordinator, at (808) 635-5117 for pickup. When in doubt as to the correct identification of the dead seabird handle as if it were one of the three listed species identified above.

Guests are to be informed of the reduction in lighting by means of the Free Style Daily: Example for Freestyle Daily.

“From September – December, Hawaii’s protected seabirds; fledglings will be taking flight into the Open Ocean. As a precautionary measure, The Pride of America will be reducing its lighting on its open decks, to prevent the birds from flying into the vessel and sustaining any injuries. NCL is committed to making every effort to ensure that Hawaii’s wildlife and environment are protected and cared for.” Should you find an injured bird please call our Reception desk telephone # 0.

Reception will upon being notified of a downed Seabird by a guest shall **IMMEDIATELY** notify the Environmental Officer for collection and documentation.
Training:

Per the F541 Training Matrix the E-SHEAR shearwater training shall be conducted for every crew member onboard the vessel and documented in MAPS. Training shall commence two weeks prior to the Season opening date, and will continue for all crew and Officers joining during the season. The training must be given yearly.

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Example: Fig 1

<table>
<thead>
<tr>
<th>Date</th>
<th>Reference</th>
<th>Time</th>
<th>Location or Cabin #</th>
</tr>
</thead>
<tbody>
<tr>
<td>01Feb11</td>
<td>010211</td>
<td>0700</td>
<td>Deck 6 Port side outside Cadillac Diner</td>
</tr>
<tr>
<td>02Feb11</td>
<td>010212</td>
<td>0630</td>
<td>Deck 11 Aft Lido portside adjacent wait station</td>
</tr>
</tbody>
</table>

Documenting the Downed Seabird must include a set of clear Photographs to aid in the identification of it to species. Photographs are to be sent directly to Mgr Environmental and Regulatory Compliance sbrown@nclcorp.com and NCL’s Seabird Program Biologist davidr003@hawaii.rr.com

Photographs of the seabirds must to the best extent possible follow the examples provided to the Environmental Officer. Photograph files, must be named in conjunction with the reference on the Log sheet. As per example Fig 1

The Seabird Season Log is to be filled in on a daily basis and submitted weekly to the Manger Environmental and Regulatory Compliance for review.

Reference:
Pride of America Light Reduction Plan.

Seabird Log

Seabird Photography Guidelines

Seabird Rescue Contact List

F541 E-SHEAR Training.

For further information and questions please contact sbrown@nclcorp.com Manager Environmental and Regulatory Compliance
Appendix H – Typical seabird information published in the “Free Style Daily for passengers
Informing Our Guests

Free Style Daily

From September – December, Hawaii’s protected seabirds; fledglings will be taking flight into Open Ocean. As a precautionary measure, the Pride of America will be reducing its lighting on its open decks, to prevent the birds from flying into the vessel and sustaining any injuries. NCL is committed to making every effort to ensure that Hawaii’s wildlife and environment are protected and cared for.” Should you find an injured bird please call our Reception desk telephone # 0.”
Tonight's entertainment

Tonight in the Stardust: Stardust Variety Show

You're dancing in the Stardust of our fantasies and you've been treated by the service of our special guests. Now is it time to laugh again when you watch the Stardust Variety Show. You don't need any magic or tricks or problems. Please join us for an exciting show.

Tonight in the Blue Hawaii's: Country Night

Kick up your feet for a dance in country style. Visit the bar and enjoy some Nashville-variety songs. Then you're ready to dance until 3:00 AM. Stay tuned for the fun and games, and amateur night will continue when we visit.

What's on tap today

Australian Beeswax Tohono-ninga: Tohono-ninga is a natural product. Take it up by 9:00 PM and enjoy a glass. Then make your way to the Stardust Bar and enjoy our entertainment. Visit the Stardust Bar and enjoy our entertainment. The Stardust Bar is open until 3:00 AM. Then make your way to the Stardust Bar and enjoy our entertainment. The Stardust Bar is open until 3:00 AM.

HONOLULU, HAWAII

You will certainly want to enjoy all that the town of Honolulu has to offer. It's known for its natural and scenic landscapes, including Waikiki Beach and the North Shore. As you visit the island of Oahu, you'll find a variety of the island's natural beauty.

Oahu's beaches are a mix of sand, water, and beautiful views.

What's on tap today

Australian Beeswax Tohono-ninga: Tohono-ninga is a natural product. Take it up by 9:00 PM and enjoy a glass. Then make your way to the Stardust Bar and enjoy our entertainment. Visit the Stardust Bar and enjoy our entertainment. The Stardust Bar is open until 3:00 AM. Then make your way to the Stardust Bar and enjoy our entertainment. The Stardust Bar is open until 3:00 AM.
Kaua‘i Seabird Habitat Conservation Program (KSHCP)

Participant Inclusion Plan (PIP)

Name of Applicant/Participant: 
SOF – XI Kauai PV Hotel, LP 
(Princeville Resort Kauai)
**PART 1: Landowner & Property Information; Description of the Facilities; Avoidance & Minimization Measures; Monitoring of Take**

**Item 1.** Provide the name of the landowner, business, agency, or institution and complete contact information. If the applicant/participant is different from the landowner, please attach power of attorney (or other documentation) allowing the party to act on the landowner’s behalf.

<table>
<thead>
<tr>
<th>Participant/Applicant Name:</th>
<th>The Princeville Resort Kauai</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Address/Location of Facility:</td>
<td>The Princeville Resort Kauai 5520 Ka Haku Road Princeville, Hawaii 96722</td>
</tr>
<tr>
<td>Mailing Address:</td>
<td>Same as above</td>
</tr>
<tr>
<td>Primary Contact:</td>
<td>Ownership Name: Robert Geimer</td>
</tr>
<tr>
<td>Address:</td>
<td>SOF – XI Kauai PV Hotel, LP 591 West Putnam Ave. Greenwich, CT 06830</td>
</tr>
<tr>
<td>Alternate Contact:</td>
<td>Thomas Meding General Manager</td>
</tr>
<tr>
<td>Address:</td>
<td>The Princeville Resort Kauai 5520 Ka Haku Road Princeville, Hawaii 96722</td>
</tr>
</tbody>
</table>

Telephone: Email: 

---
Item 2. Provide the legal description of the property at which the existing facilities and Covered Activities are located, including Tax Map Key (TMK) number. Provide a survey of the property and site plan drawings showing the locations of the Covered Activities (lights), property boundaries, buildings & structures, and site features. If properties containing the Covered Activities comprise separate parcels please include all Tax Map Key numbers and maps.

The Princeville Resort Kauai is located at a physical street address of 5520 Ka Haku Road, Princeville, Hawai‘i. 96722. The resort encompasses approximately 23.23 acres of land identified as TMK(s): (4) 5-4-004-029, (4) 5-4-004-035 and (4) 5-4-011-004. Copies of these TMKs maps are included in Appendix A.

Item 3. Describe the existing Covered Activities for which incidental take authorization is sought. Include list of buildings, type and description of lights present, purpose and location of lights and current seabird lighting accommodation in place (e.g. shielding, downward pointing, switched off during fledging season etc). For “Types of lights” please use the following categories:

- Parking Lights
- Signage Illumination
- Wall-pack Building Lights
- Landscaping/Grounds/Accent/Bollards
- Indoor lights visible from outdoors
- Roof Floodlights
- Other Lights

Facility lighting plan may be submitted as lighting inventory. Photos may be attached. The suggested light table, and Green Sea Turtle assessment table below may each be modified as needed to provide the necessary information.

The owner of the Princeville Resort Kauai is seeking coverage for operation of artificial lighting in connection with all activities associated with running a resort in Princeville. These activities include, but are not limited to the following: general operation of the hotel, parking lot, grounds, swimming pool and outdoor restaurants, one bar and outdoor banquet activities, as well as all physical plant maintenance and landscape maintenance activities. The resort has a full complement of lights that one would expect at a resort of this size and location on the island of Kaua‘i. The Hotel covers approximately 115,000 square feet of the site, and paved areas such as the parking lot, walkways, driveway and the pool deck cover an additional 151,400 square feet of the property.
Table 1: Outdoor Lighting

<table>
<thead>
<tr>
<th>Location</th>
<th>Light Type</th>
<th>Wattage</th>
<th>Bulb Color</th>
<th>Quantity</th>
<th>Purpose</th>
<th>Full cutoff/shielded</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parking lot</td>
<td>Parking Pole Light/Mercury lamp</td>
<td>150 w</td>
<td>Warm White</td>
<td>26</td>
<td>Illuminate parking lot and pedestrian walkway</td>
<td>Full cutoff/shielded</td>
</tr>
<tr>
<td>Guard Shack - Entrance and Exit to the Resort</td>
<td>Shielded Flood Light/Florescent</td>
<td>11 w</td>
<td>Warm White</td>
<td>2</td>
<td>Entrance safety</td>
<td>Shielded</td>
</tr>
<tr>
<td>Guest walkway between Porte Cochere and Parking lot</td>
<td>Mushroom walkway Lights/Incandescent</td>
<td>20 w</td>
<td>Warm White</td>
<td>23</td>
<td>Illuminate pedestrian walkway</td>
<td>Full cutoff/shielded</td>
</tr>
<tr>
<td>Entry Drive and Walkway</td>
<td>Landscaping &amp; grounds lights/Halogen</td>
<td>50 w</td>
<td>Cool White</td>
<td>36</td>
<td>Landscape illumination; accent lighting</td>
<td>Full cutoff/shielded</td>
</tr>
<tr>
<td>Coconut Trees around Porte Cochere water feature</td>
<td>Landscaping &amp; grounds accent up lights/Halogen</td>
<td>20 w</td>
<td>Cool White</td>
<td>16</td>
<td>Landscape illumination; accent lighting</td>
<td>Shielded</td>
</tr>
<tr>
<td>Water Feature</td>
<td>Water Feature lights/Incandescent</td>
<td>100 w</td>
<td>Warm White</td>
<td>26</td>
<td>Accent lighting in water feature</td>
<td>No</td>
</tr>
<tr>
<td>Cooling Tower and Flower Shop</td>
<td>Shielded Flood Light/Florescent</td>
<td>11 w</td>
<td>Warm White</td>
<td>2</td>
<td>Staff safety</td>
<td>Shielded</td>
</tr>
<tr>
<td>Various locations around the Pool</td>
<td>Tiki Torches</td>
<td>N/A</td>
<td>Open Flame</td>
<td>18</td>
<td>Accent lighting and illumination for pedestrian walkway</td>
<td>N/A</td>
</tr>
<tr>
<td>Various locations around the Pool</td>
<td>Surface Mounted/Florescent</td>
<td>45 w</td>
<td>Cool White</td>
<td>2</td>
<td>Staff safety</td>
<td>No</td>
</tr>
<tr>
<td>Pool Restaurant and Pool Activity Desk</td>
<td>Chandelier/CFL</td>
<td>40 w</td>
<td>Cool White</td>
<td>22</td>
<td>Accent lighting and guest safety</td>
<td>Full cutoff/shielded</td>
</tr>
<tr>
<td>Pool Restaurant and Pool Activity Desk</td>
<td>Architectural Accent Lighting/Halogen</td>
<td>50 w</td>
<td>Cool White</td>
<td>82</td>
<td>Accent lighting and guest safety</td>
<td>Full cutoff/shielded</td>
</tr>
<tr>
<td>Pool walkway</td>
<td>Landscaping &amp; grounds lighting/Halogen</td>
<td>50 w</td>
<td>Cool White</td>
<td>15</td>
<td>Landscape illumination; accent lighting and walkway illumination</td>
<td>Full cutoff/shielded</td>
</tr>
<tr>
<td>Pool Walkway</td>
<td>Incandescent</td>
<td>40 w</td>
<td>Warm White</td>
<td>9</td>
<td>Pedestrian walkway illumination</td>
<td>Shielded</td>
</tr>
</tbody>
</table>
The above description of outdoor lighting was current as of 2016. Modifications to lighting have been made since that time on an annual basis. The Resort has minimized lighting to the maximum extent practicable.
Table 2: Green Sea Turtle Assessment for the Site & Facility

Please provide the information requested below to help determine if measures to avoid impacts to the Green Sea Turtle(s) from the effects of light attraction are required to be implemented at any of the facility(s), parcel(s), or site(s) included in this PIP. Please consult with staff from the DLNR and the USFWS to arrange a site visit, if needed, discuss measures to avoid impacts to the Green Sea Turtle, and provide further guidance.

<table>
<thead>
<tr>
<th>Question</th>
<th>YES/ No</th>
<th>Information Provided</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are any of the facilities located adjacent to a beach?</td>
<td>YES/ No</td>
<td>If yes, provide length of beach frontage &amp; brief description of facilities &amp; lights adjacent to the beach. Puu Poa Beach is approximately 200 feet long and is located fronting the swimming pool. Facilities adjacent to the beach include the pool, pool restaurant, pool activity desk and pool walkway.</td>
</tr>
<tr>
<td>Are any of the Covered Activities (lights) visible from a beach?</td>
<td>YES / No</td>
<td>If yes, describe the specific lights (type, height, purpose) &amp; specific location; provide map &amp; photos showing distance from beach. See Table 1 above</td>
</tr>
<tr>
<td>Have green sea turtles been known to nest on any beaches adjacent to the facilities?</td>
<td>Yes / NO</td>
<td>If yes, provide information about nesting occurrences, if known, including location and date and any other information</td>
</tr>
</tbody>
</table>
Item 4. If applicable, describe any lighting standards (e.g., foot candles/area) required for facility operations or other requirements that necessitate the use of lighting (e.g., required for security, safety, operations). Describe the relevant standard, or regulation, and the areas and Covered Activities at the site (e.g., type of lighting) to which it applies.

There are no specific lighting standards, rules, restrictions or requirements that the Resort must comply with, beyond assuring that lighting is adequate to ensure guest and employee safety and security, and standards in the building code (IECC). Pre-seabird season lighting audits are conducted by a seabird biologist and necessary tweaks to the lighting are completed prior to the start of the seabird season each year – the program is now in its 10th year.

Item 5. Describe any plans/proposals for future facilities or expansion of existing facilities. Include any proposed structures and lighting by type, purpose, and location. Plans (architecture and site plans), photos, and drawings can be attached.

The owner of the Princeville Resort Kauai currently plans a renovation to refresh the property, with a reopening to follow in third quarter 2021. The renovation will not involve expansion of the existing facilities. The planning team will work in close consultation with a seabird biologist.

Item 6. Pursuant to the Endangered Species Act (ESA), Section 10 (a)(2)(A)(iii), describe alternatives to avoid the taking considered and evaluated. Provide reasons why those alternatives are not being utilized. Alternatives can include operational or facility design changes (attach pages as needed). The tables below may be altered as needed.

Activities that the Princeville Resort Kauai has direct control over that may result in covered species landing on the property are restricted to those associated with lighting. Other programs that the Resort implements that result in benefits to seabirds include, increased staff training, guest outreach, and monitoring and rapid recovery of downed seabirds. The resort has addressed all of these issues to the maximum extent practicable. Measures and protocols implemented are detailed in the following sections of the application.

In the following table light attraction avoidance and minimization alternatives that were analyzed are presented.
<table>
<thead>
<tr>
<th>Artificial Light Attraction Alternatives to the Taking Considered</th>
<th>Reasons Alternatives are not Being Utilized (provide justification)</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Deactivate all outdoor artificial lights from dusk to dawn during the fledgling fall-out season September 15 to December 15</td>
<td>Guest and staff safety and security precludes this option.</td>
</tr>
<tr>
<td>▪ Change operations to eliminate the need for outdoor artificial lighting (e.g., from nighttime to daylight hours)</td>
<td>Guest and staff safety and security precludes this option. To do this the hotel would need to be closed at night, not a viable business option.</td>
</tr>
<tr>
<td>▪ Shield all lights from visibility from the beach, or screen all Green Sea Turtle nests, from May 15 to December 15 to avoid impacting the green sea turtle (Green Sea Turtle)</td>
<td>Guest and staff safety and security precludes this option at it would entail closing the hotel during those months which is not a viable business option.</td>
</tr>
<tr>
<td>▪ Other alternatives to the taking considered, if any. If facility is proposed, include alternative designs considered</td>
<td>The resort has replaced a very large number of lights on and in the resort to reduce the amount of stray light being produced. Window blinds have been placed in all hallways and rooms in the resort reducing the visible interior lighting. Bulbs have been reduced in lumens over the past 10 years. All upward pointing lights have been removed or are turned off during seabird fledging season. See Seabird Lighting Minimization Procedures on Page 1-14.</td>
</tr>
</tbody>
</table>
Item 7. Describe all site-specific seabird minimization measures considered for the Covered Activities. This item should follow KSHCP minimization objectives and measures as specified in Appendix E (Guidelines for Adjusting Lighting at Facilities) of the KSHCP document. Please consult with staff from the DOFAW and the USFWS as needed. The suggested tables below can be altered as needed.

Minimization measures modify the Covered Activities to reduce the effects of the activity on the Covered Species. KSHCP Participants will be required to implement minimization measures that apply to the facility to the “maximum extent practicable” per applicable state and federal laws which regulate incidental take license/permit issuance by the DLNR and the USFWS.

Minimization also entails searching and recovering grounded seabirds to minimize the chance of mortality. In addition, the presence of on-site predators (i.e. feral cats, dogs) should be controlled and removed because these animals can prey on grounded seabirds.

Provide justification, such as policies, regulations, or other rationale for measures that will not be implemented.
<table>
<thead>
<tr>
<th>Minimization Measures Considered</th>
<th>Feasible? (Y / N)</th>
<th>If not Feasible to Implement Measures, Provide Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Change time of light use (lights off earlier)</td>
<td>YES/ No</td>
<td></td>
</tr>
<tr>
<td>▪ Deactivate unnecessary lights</td>
<td>YES / No</td>
<td></td>
</tr>
<tr>
<td>▪ Replace all outdoor lights with full cut-off fixtures</td>
<td>YES / No</td>
<td></td>
</tr>
<tr>
<td>▪ Shield all outdoor lights with full cut-off shields</td>
<td>YES / No</td>
<td></td>
</tr>
<tr>
<td>▪ Angle all lights downward</td>
<td>YES / No</td>
<td></td>
</tr>
<tr>
<td>▪ Lower intensity (lumens) of outdoor lights</td>
<td>YES / No</td>
<td></td>
</tr>
<tr>
<td>▪ Change bulb color to non-white spectrum</td>
<td>YES / No</td>
<td></td>
</tr>
<tr>
<td>▪ Prohibit/control unleashed predatory animals; prohibit outdoor feeding of animals; require sealed rubbish containers</td>
<td>YES / No</td>
<td>See previous section and Appendix C</td>
</tr>
<tr>
<td>▪ Provide Worker Seabird Awareness Training to staff</td>
<td>YES / No</td>
<td>See previous section and Appendices F, G, H, I, and J.</td>
</tr>
<tr>
<td>▪ Provide outreach materials to staff &amp; guests</td>
<td>YES / No</td>
<td></td>
</tr>
<tr>
<td>▪ Host Save Our Shearwaters (SOS) Aid Station</td>
<td>YES / No</td>
<td></td>
</tr>
</tbody>
</table>
Item 8. Minimization Plans. Provide a plan to minimize the effects to the Covered Seabirds due to the Covered Activities. KSHCP Participants will be required to minimize the effects of the Covered Activities to the “maximum extent practicable” per applicable state and federal laws which regulate take license/permit issuance. The KSHCP document provides minimization objectives and measures to follow.

The Minimization Plans should include the proposed minimization measures, timeline, and estimated cost for each facility. In this item, the Participant can include measures already completed or in place (new lights, shields, operational changes). Timeline should include estimated completion schedule, and annual schedule for minimization that will occur only during fledging season.

Minimization measures not yet determined but anticipated to occur at the facility; this section should include an estimated cost that will be earmarked for future minimization measures.

If applicable, the participant must provide the reasoning why certain measures will not be implemented. The suggested table below may each be altered to best describe the Minimization Plan. Attach additional pages, photos, and drawings as needed.

Pre-Renovation 8A

The Princeville Resort Kauai is providing two Item 8 write ups due to the rather unusual situation that it applicant found itself in when it was decided in 2008 that the owners of the property were going to remodel the Resort. The following section details the Avoidance and Minimization Plan implemented by the Resort in 2007. The following Section 8B details the Avoidance and Minimization Plan that the Resort implemented in 2008-2009 and has followed for the past ten years.

In 2007 the Resort undertook the following minimization measures to reduce the potential that its lights would result in attracting the covered species onto the property. The lighting modifications presented below are grouped into seven separate locations; these locations are illustrated in the Resort schematic provided in Appendix B.

The 40-watt bulbs in the main lobby chandelier were replaced with 15-watt bulbs. The Living Room and Café Hanalei chandeliers were dimmed to approximately 50% of the intensity that they are traditionally set at. In the Living Room Lanai, two floodlights were fitted with red filters and directed downwards to reflect into the stairwell, rather than the garden.

The three spotlights illuminating the flagpole at the front of the hotel were turned off, for the duration of the seabird season. All of the palm tree accent floodlights along Royal Palm Drive were redirected so as to shine on the ground rather than up at the palm fronds. During the seabird season, half of the parking lot lights were disabled guests are not allowed to park there own cars, all cars are parked by the resorts valet staff.
The large chandelier and the fluorescent trough lighting located in the third floor elevator shaft and hallway were disabled during the seabird season.

The floodlights located on the 3rd floor roof were disabled and new solar powered low wattage landscape lighting was installed to illuminate the walkways formerly illuminated by the 3rd floor roof floodlights.

The landscape accent lighting that illuminates the palm trees in the front of the hotel were redirected at the ground. Light shields were installed on the guardhouse, and the lights were redirected downwards to illuminate the road and entrance rather than the structure. Light shields were installed on the lights that illuminate the entrance sign to the property.

The foregoing avoidance and minimization measures were implemented, and costs associated with implementing these measures have already been incurred.

### Light Attraction Avoidance and Minimization Plan

#### Facility Lights / Description of Action

- Guard shack lights were shielded with in house constructed shields and fixtures redirected downward
- Light shields were installed on the lights illuminating the entrance sign to the property
- Up---pointing landscape accent lighting on the palm trees in front of the fountain were redirected downward
- The three floodlights illuminating the flagpole in front of the porte cochere were turned off for the duration of the seabird season
- All of the up---pointing accent lighting on the palms along Royal Palm Drive were redirected to shine downward. During the seabird season, the parking lot lights were disabled and guests were escorted to the hotel by valets using flashlights
- The 40---watt bulbs in the main lobby chandelier were replaced with 15---watt bulbs
- The lights within the Café Hanalei and the Living Room were dimmed to approximately 50% of their intensity
- The 2 spotlights on the Living Room Lanai were fitted with Red filters and redirected downwards
- The large chandelier and fluorescent soffit lighting located on the third floor elevator shaft and corridor were disabled during Seabird season
- The three floodlights located on the 3rd floor roof were removed and new solar powered low---wattage landscape lighting was installed to illuminate the walkways formerly lit by the 3 floodlights
Post -Renovation 8b

In 2008 and early 2009 the Princeville Resort Kauai underwent a major resort-wide renovation. This planned upgrade of the property allowed the then-St. Regis to make permanent modifications to its lighting fixtures. Planners and electrical engineers met with the St. Regis’ consulting biologist to explore measures that could be taken to reduce extraneous light to the maximum extent practicable as part of the resort renovation. The following changes were made to the lighting at the Resort as part of the Resort renovation.

Where practical, electrical lighting circuits were put on separate circuits so as to make it easier to turn off selected lights during the seabird’s season if needed – formerly light bulbs had to be physically removed from some fixtures to turn them off.

The main lobby chandelier was replaced with a much lower intensity fixture, and the glass skylight above the chandelier was covered, preventing light from shining up through the roof. The two exterior floodlights were removed. The chandeliers in the Makana Terrace (formerly the Café Hanalei) were removed and replaced with a trellis, and lit with ribbon accent lighting, which does not put off much light. This new fixture was also lowered preventing it from being seen from outside the hotel. Polarized window shades in the Bar of the Princeville Resort Kauai (formerly the Living Room) are lowered during evening hours during the seabird season to darken the windows that face Hanalei Bay. Lighting within the Makana Terrace consists of low wattage can lighting that is directed at the floor and is under roof.

All of the palm tree and landscape accent floodlights along Royal Palm Drive were removed and replaced with downward facing heavily shielded low wattage LED lights, which cast a small circle of light on the ground and vegetation but are completely shielded. The lights in the parking lot are shielded and downward facing, and if necessary will be turned off during the seabird season.

The large chandelier located in the third floor elevator shaft and hallway is no longer operational.

The landscape accent lighting that illuminates the palm trees in the front of the hotel were changed out to small canister low wattage LED lights that are totally shielded and are aimed at the ground.

Additional Locations – The lighting in the new pool has been placed on a separate circuit and can now be selectively turned off during the seabird season. Bollard lighting with deflection shields (Turtle lights) have replaced floodlights and accent lighting along the walkways on the ocean side of the hotel. A new restaurant / bar, the Nalu Kai has been constructed adjacent to the pool, lighting within the new bar is contained with under-
roof soffits or downwards facing light fixtures, all lights at this location are under roof. The bollard lighting that ran up slope from the Porte Cochere to the Fort Alexander interpretive kiosk has been removed. Additionally, several outside floodlights and work lights that were located in and around the cooling tower and loading dock have been disabled or removed.

The foregoing A&M measures have already been implemented, and costs associated with implementing these measures have already been incurred.

During the seabird fledging season the Resort implements additional light minimization measures detailed in: Shearwater Lighting Minimization Measures, attached as Appendix F. The 29 measures detailed in that set of procedures requires that the engineering and other responsible parties identified sign off that the procedures have been implemented.

The Princeville Resort Kauai biologist accompanies the head of loss prevention and the engineering departments to conduct a lighting audit of the entire property prior to the onset of the seabird fallout season annually. The resort biologist follows up with the resort to ensure that any lighting minimization modifications that the biologist identified have been implemented. The resort biologist also checks the hotel several times during the season without notifying the Resort to ensure that all measures are in place. At this juncture after more than 10 years of implementing the seabird season specific lighting minimization measures we have found that it takes less than half a day each year to correct any lighting minimization measures that may need to be modified. The biologist monitors the fallout season in real time and returns to the Resort if anything shows up in the data that suggests that there may be a problem with the lighting minimization measures.

During the season the head of loss prevention, and the engineering department manager do regular checks of the lighting minimization measures to ensure that they age still in operation. All of the lighting is now computerized, so maintaining and reduced lighting that may be implemented is very simple and is controlled from one location.
### Table 5: Lighting Minimization Measures

<table>
<thead>
<tr>
<th>List of Buildings</th>
<th>Minimization Measures</th>
<th>Cost to Implement</th>
<th>Responsible Staff</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>

See narrative above.
<table>
<thead>
<tr>
<th>Minimization Measures</th>
<th>Describe minimization method (e.g. trapping, outreach, enact policy)</th>
<th>Cost to Implement</th>
<th>Responsible Staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remove &amp; control loose predatory animals at the facility. (Loose animals can kill grounded seabirds and this measure aims to prevent seabird mortality by animals.)</td>
<td>The resort employs commercial pest control services, additionally they deploy cat traps as soon as a cat is spotted on property (very rarely)</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Prohibit outdoor feeding of predatory animals. (feeding animals attracts them to the site and this measure aims to reduce the presence of animals that can cause seabird mortality.)</td>
<td>Staff is trained that this is not allowed, and security monitors compliance</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Conduct nightly/morning searches to recover downed birds at the property &amp; turn them into SOS following protocols (see monitoring plan below).</td>
<td>See Item 9 below.</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Train staff to follow minimization measures.</td>
<td>See Item 9 below, and Appendix C.</td>
<td>N/A</td>
<td></td>
</tr>
</tbody>
</table>
Item 9. Take Monitoring Plan. Provide a plan to monitor take of the Covered Seabirds at the facilities proposed to be covered by the incidental take permit/license. The take monitoring plan describes how the property will be searched for downed Covered Seabirds. The KSHCP document provides standards and guidelines for take monitoring to ensure that take of the species is accurately measured and recorded.

The regulatory agencies will make the final determination as to the adequacy of the take monitoring plan.

Loss prevention personnel search the entire Resort multiple times a day, 365 days of the year. The entire staff is retrained prior to the seabird season every year. As part of their job responsibilities, they are required to search their duty stations every day that they are on the property. Since there are approximately 400 employees, the coverage of the property is complete. If a bird is found, employees are required to call loss prevention and stay with the bird until they arrive to record, handle and deliver the bird to the SOS station and prepare all of the needed reporting.
Table 7: Covered Seabird Take Monitoring Protocols

<table>
<thead>
<tr>
<th>Item</th>
<th>Protocol (fill in protocol &amp; provide reasons)</th>
<th>KSHCP Guideline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage of the total property that will be searched &amp; the total area to be searched</td>
<td>The entire built upon portion of the property is searched multiple times a day, as all associates are required to search their duty stations and Security staff search the rest of the property.</td>
<td>Search as much area as possible</td>
</tr>
<tr>
<td>Frequency of searches (# per day or per week)</td>
<td>During the Seabird season, security staff inspects the grounds of the hotel at least twice a day and staff members are required to actively look for birds that have landed on the property in the areas that they work during their entire eight hour shifts</td>
<td>Twice daily</td>
</tr>
<tr>
<td>Time of day of searches</td>
<td>See above</td>
<td>2-3 hours after sunset, and within 3 hours after sunrise</td>
</tr>
<tr>
<td>Number of searchers per search area</td>
<td>The entire staff, amounting to some 400 employees</td>
<td>Depends on site conditions and safety considerations and vegetation, nearby hazards/threats</td>
</tr>
<tr>
<td>Proposed training</td>
<td>See Item 7 above, Item 9 below, and Appendix C.</td>
<td>Annual training covering seabird identification, seabird handling, response procedures, verified and documented</td>
</tr>
</tbody>
</table>
Item 10. Components of the Green Sea Turtle Minimization and Monitoring Plan (if required). Monitoring and minimization for the Green Sea Turtle is in two parts: A) Monitoring to detect nests and B) Monitoring and minimizing impacts to nests detected.

Part A: Monitoring to detect Green Sea Turtle Nests
Please provide the following information; the table below may be used and altered as needed.

1) Detailed location and description of beaches, including linear distance, at which searching for nests of the green sea turtle will take place. Searches should take place at any beach from which light at the facility can be viewed;

2) Monitoring protocols indicating:
   a) Annual training of searchers;
   b) Frequency of searches;
   c) Conduct active searching (searching the beach width);
   d) Sufficient number of trained searchers to cover the area; and
   e) Record results of search monitoring.

3) All Participants are required to record the results of search efforts. Records should provide:
   a) Evidence (what was seen). Include description and provide photographs
   b) Location on the beach (GPS) and physically mark the location if possible
   c) Date and time of day
   d) Description of surrounding land use (e.g., vacant, or developed), and
   e) Proximity to the facility.

Part B: Monitoring of Identified Green Sea Turtle Nests
Each identified nest of the green sea turtle should be monitored and protected from light attraction. Please provide the following monitoring protocols; the tables below may be used and altered as needed.

1. Light avoidance measure for identified nests (either shield/deactivate lights at the facility or install and maintain a light shield around each identified nest);
2. Frequency of searches;
3. Number of searches monitoring the nests. The number of needed to monitor active nests will depend on number of nests identified and amount of beach needed to be covered;
4. Record the results of nest monitoring. Monitoring should provide:
   a) Evidence of hatchling emergence (description and photos):
   b) Date and time of emergence,
   c) Direction of tracks
   d) Condition of the nest area (e.g., disturbed or not).
**Table 8: Green Sea Turtle Monitoring Protocols – Part A: Monitoring to Detect Nests**

Please provide search protocols for detecting nests of the green sea turtle (Attach pages as needed)

<table>
<thead>
<tr>
<th>Item</th>
<th>Protocol (fill in protocol &amp; provide reasons)</th>
<th>KSHCP Guideline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location &amp; description of the beach, or beaches, surveyed and the linear distance of the beach.</td>
<td>Puu Poa Beach is approximately 200 feet long and is located directly in front of the pool. Groundskeepers rake the beach every morning shortly after daylight.</td>
<td>Beach area surveyed should coincide with visibility from the facility with the lights.</td>
</tr>
<tr>
<td>Frequency of searches (# per day or per week)</td>
<td>Groundskeepers rake the beach every morning shortly after daylight 365 days of the year. Life guards and pool attendants are in the area 365 days of the year as well and are trained to see sea turtles</td>
<td>Weekly during nesting season (typ. May 15 to end of August)</td>
</tr>
<tr>
<td>Number of searchers per search area</td>
<td>Groundskeepers rake the beach every morning shortly after daylight 365 days of the year. Life guards and pool attendants are in the area 365 days of the year as well and are trained to see sea turtles</td>
<td>Depends on site conditions and safety considerations</td>
</tr>
<tr>
<td>Proposed training</td>
<td>N/A</td>
<td>Searchers should receive annual training conducted by the DLNR or the USFWS, or their designee. See item 9a.</td>
</tr>
<tr>
<td>Item</td>
<td>Protocol (fill in protocol &amp; provide reasons)</td>
<td>KSHCP Guideline</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>------------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Frequency of checks (# per day or per week)</td>
<td>N/A there has never been a nest recorded on Puu Poa beach since the hotel has been in operation. Should a nest be discovered the Resort would immediately contact USFWS and follow their standard Hawaii protocols for protecting the nest.</td>
<td>Active nests should be monitored every 1-2 days; then daily during expected hatching date</td>
</tr>
<tr>
<td>Light avoidance</td>
<td>N/A</td>
<td>If lights cannot be deactivated or shielded from the nest, each nest should be screened from visible light.</td>
</tr>
<tr>
<td>Number of searchers per search area</td>
<td>N/A</td>
<td>Depends on site conditions and safety considerations</td>
</tr>
</tbody>
</table>
Item 11. Describe the schedule that will be followed to provide training for staff. Training must be provided to those that will conduct and oversee the searches at the facility.

The training should include:

1. Summary of regulations protecting the Covered Species;
2. Search procedures, route, frequency and timing specific to the facility’s monitoring plan, for seabirds and green sea turtle nests (if applicable);
3. Response procedures including safe and proper techniques for handling seabirds;
4. Recognizing evidence of green sea turtle nests, proper nest light screening, and hatchling activity (if green sea turtle minimization and monitoring plan is applicable);
5. Procedures to document the results of searches;
6. Downed wildlife agency contacts; and
7. Nearest SOS aid station.

Rescuing Downed Seabirds—Standard Operating Procedures (SOP)

The following steps provide the procedure for recovering downed seabirds found:

1. Take the seabird recovery kit and pet carrier to the downed seabird.
2. Put on gloves.
3. Using towel to gently cover the bird, pick up the seabird.
4. Place the seabird in the pet carrier, and close the pet carrier.
5. Put the gloves and towel back in the seabird rescue kit.
6. Take the bird and pet carrier to an SOS Aid Station.
7. Transfer the bird to the Aid Station’s pet carrier.
8. Call SOS at 632-0610 or 635-5117.
9. Return the seabird rescue kit and pet carrier.
11. Give the completed “Bird Take Field Report” to the General Manager, or other responsible staff person at the facility.

Contents of Seabird Recovery Kit

1. Latex or nitrile gloves;
2. Three towels;
3. Hand sanitizer;
4. Flashlight or headlamp;
5. Clipboard, pen and blank “Bird Take Field Reports”, or similar; and
6. Pet carrier – medium sized. If a box is used it must be well ventilated and marked conspicuously “LIVE ANIMAL”.
The entire staff of the resort is retrained every year, and training is usually conducted in early August. The specific dates for the training are based on the hotel occupancy and other personnel issues, but training always happens prior to the seabird season starting in September. See Table 7 and Section 9 above and Appendix C.

**Item 12. Describe any outreach conducted (e.g., handing out pamphlets on seabird awareness to facility employees or guests, ):**

During the seabird season an article is printed in the weekly guest newsletter about the shearwater season, this newsletter is placed in every guest room. A copy of a typical seabird season guest newsletter is attached as Appendix G. Additionally, a printed brochure entitled “The Princeville Resort Kauai Seabird Conservation Program” is handed out to each hotel guest during the seabird season at check-in that encourages them to close their louvered window panels at night to shield light sources that may attract fledgling shearwaters and that also provides information on the birds, the SOS program and the Princeville Resort Kauai’s commitment to the conservation of native island resources. A copy of the current brochure is attached as Appendix G. Additionally, in guest rooms, staff close the wooden window louvers each evening during turndown service, and shearwater awareness signage has been placed in all guest rooms that requests that guests keep their window louvers closed during nighttime hours during the seabird season. A copy of this display is attached as Appendix H. Printed cards are placed in the Prince Junior Suites requesting that guests turn off the bathroom lights when not in use during the seabird season. A copy of these signs are attached as Appendix I.

The Princeville Resort Kauai commissioned artist Patrick Ching to produce a children’s coloring book that tells the story of a Newell’s Shearwater that has been downed, told through the eyes of other native species including a Hawaiian Monk Seal, Laysan Albatross, crabs etc. The coloring book is used as part of the resort’s “Young Voyagers Club”, its in-house children’s program that is directed at children between the ages of 5 and 12. A copy of the cover and two typical inside pages of the coloring book is attached as Appendix J.

A seabird awareness-training program is conducted for all employees once a year. It is an employment requirement that all employees undergo the training program. There are two modules to the training program, one is given to every employee and the second “Downed Seabird Advanced Training” is given to the security staff and to the managers. The training module is revised each year prior to the start of the seabird season incorporating any needed changes to the program identified during the previous season’s activities. A seabird specialist initially conducted all of the seabird awareness training, for the first four years. During that period the biologist trained the HR and Security
department to conduct the training on an annual basis. Copies of the 2017 version of the
PowerPoint slides used in this training program are provided in Appendix C.

Synopsis of the Princeville Resort Kauai Seabird Awareness Training:

• Agency and Seabird Program Contacts
• Slides illustrating both threatened and endangered seabird species as well as the more
  commonly occurring species protected under the federal MBTA.
• Regulatory framework, both federal and state
• Definitions of “take”
• Penalties for non-compliance
• Seabird season lighting rules and protocols
• Seabird handling procedures and protocols

Synopsis of the Advanced Seabird Awareness Training:

• Downed seabird response protocols
• Downed seabird security report
• Seabird reporting loop
• Seabird identification
• This module also has a workshop in which the following topics are discussed
  • Cameras, camera settings, image numbering
  • How to take photos of the birds
  • Data recording and reporting
PART 2. Take Estimate, Requested Amount of Take Authorization, and Funding

Item 1. Show the calculation of estimated take for each of the Covered Species.

Following the take estimation methods in the KSHCP for estimating a Participant’s take, the tables and charts below show the take estimate calculation for the facility for each of the Covered Seabirds.

The KSHCP take estimate method utilizes the average of the most recent 5 years of SOS recovery data for the facility. Applied to the data is an adjustment for downed birds not found, assumed at 50 percent.

If the landowner-applicant submits a take estimate with an alternate discovery rate, they must provide the reasons why an alternate rate was used to estimate take, including relevant information supporting their reasoning.

We have used the numbers generated by the SOS program, and verified through our own database to determine take. To determine the searcher efficiency of the property we commissioned a large-scale map of the property and then calculated the amount of the property that is impossible to search due to cliff faces and/or very dense hau bushes. From those calculations we determined that we could not effectively search slightly less than 10% of the property.

**Table 10: Annual Take Estimate Calculation**

<table>
<thead>
<tr>
<th></th>
<th>Newell’s Shearwater</th>
<th>Hawaiian Petrel</th>
<th>Band-rumped Storm-Petrel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avg. from SOS data—or—monitoring data (5 most recent yrs. = 2012-2016)</td>
<td>18</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Avg. from SOS data—or—monitoring data (15 most recent yrs. =2002-2016)</td>
<td>–</td>
<td>0.33</td>
<td>0</td>
</tr>
<tr>
<td>Avg. lethal take estimate = 12% of SOS birds not released</td>
<td>2.16</td>
<td>0.04</td>
<td>0</td>
</tr>
<tr>
<td>Adjustment for unobserved take (10% not searchable vs 50% typical)</td>
<td>1.8</td>
<td>0.03</td>
<td>0</td>
</tr>
<tr>
<td>Total annual lethal take from light attraction</td>
<td>3.96</td>
<td>0.07</td>
<td>0</td>
</tr>
<tr>
<td>Requested Annual Take</td>
<td>4</td>
<td>0.2 (1 every five years)</td>
<td>0.033 (1 for 30 year permit)</td>
</tr>
<tr>
<td>Requested Take Over Permit Term</td>
<td>120</td>
<td>6</td>
<td>1</td>
</tr>
</tbody>
</table>
Item 2. Select the requested take authorization and permit/license term coverage for each of the Covered Species.

**Table 11: Newell’s Shearwater:**

<table>
<thead>
<tr>
<th>Age Class</th>
<th>Annual Take Estimate: Fledglings</th>
<th>Annual Take Estimate: Adults or sub-adults</th>
<th>Take Limit for License/Permit Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortality (Lethal)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Injury (Non-lethal)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 12: Hawaiian Petrel:**

<table>
<thead>
<tr>
<th>Age Class</th>
<th>Annual Take Estimate: Fledglings</th>
<th>Annual Take Estimate: Adults or sub-adults</th>
<th>Take Limit for License/Permit Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortality (Lethal)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Injury (Non-lethal)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 13: Band-rumped Storm-Petrel:**

<table>
<thead>
<tr>
<th>Age Class</th>
<th>Annual Take Estimate: Fledglings</th>
<th>Annual Take Estimate: Adults or sub-adults</th>
<th>Take Limit for License/Permit Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortality (Lethal)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Injury (Non-lethal)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Item 3. Funding Assurance. Provide proof of adequate funding (see KSHCP document). All participants must demonstrate requisite funding prior to permit/license approval to ensure that the proposed measures and actions, including monitoring, will be undertaken in accordance with the terms and schedule of the KSHCP.

The Princeville Resort Kauai currently undertakes all minimization and conducts all monitoring using its existing staff as part of annual operating budget, and will continue to do so through the term of the KSHCP. The Princeville Resort Kauai will provide financial assurances as required by the KSHCP.

Signature of Participant: 

________________________________________

Printed Name: 

________________________________________

Date:___________________

The undersigned affirms that all the information included is true and accurate to the best of the participant’s knowledge and that this PIP is voluntarily submitted.

☐ check to waive confidentiality
1. Appendices

Appendix A – Tax Map Keys (TMKs) of the Princeville Resort Kauai

Appendix B – Schematic layout of the resort

Appendix C – Staff seabird awareness training program

Appendix D – Typical seabird data recovery form

Appendix E – Seabird season lighting protocols

Appendix F – Typical guest newsletter

Appendix G – Guest Seabird Conservation Program brochure

Appendix H – In room window louver seabird awareness rack card

Appendix I – Prince Junior Suite bathroom lighting seabird awareness rack card

Appendix J – Young Voyagers Club coloring book – Cover and two typical inside pages
Appendix A – Tax Map Keys (TMKs)

3 Maps
Appendix B - Schematic layout of the resort
Appendix C - Staff seabird awareness training program
Princeville Resort Kauai
Seabird Awareness Training Program

Prepared by: Reginald E. David
Purpose of Training

- Three protected seabird species are recovered on the resort property every fall
- The Princeville Resort is committed to the protection of these species
- The Princeville Resort has specific protected seabird protocols in place that will be followed by all associates
- There are significant legal implications if any of these birds are harmed, or the protected seabird protocols are not followed
Legal Setting - Protected Species

- Federal Law; the Endangered Species Act of 1973, as amended (ESA) and the Migratory Bird Treaty Act (MBTA)

- State Law; Hawaii Revised Statutes (Chapter 195-D)

IT IS ILLEGAL TO: “harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct”

Any species listed under any of these statutes.

- Violations of the federal ESA may include civil fines of up to $25,000 per incident, and criminal fines of up to $50,000, and up to one year imprisonment per incident.
Why Do Protected Seabirds Land on Resort Property?

- Fledgling birds on their way to sea for the first time are often attracted to lights and can be confused by them.
- Confused birds may collide with structures, or simply land on the ground too tired to continue flying.
- Once on the ground they cannot take off again and will die from starvation, dehydration or be killed by predators if not rescued.
- Approximately 97% of the downed seabirds are fledglings.
Seabird Fallout Season

The vast majority of Seabird fallout on Kauaʻi occurs between September 15 and December 15 each year.
Protected Seabird Species

Newell's Shearwater

Wedge-tailed Shearwater
Newell’s Shearwater – ‘aʻo

- Listed as a threatened species by both the U.S. and State of Hawaiʻi
- 80% of population nests on Kauaʻi
- Also breeds on Maui, Hawaiʻi and possibly Molokai
Wedge-tailed Shearwater – ‘u‘aukani

- Protected under the federal MBTA
- Breeds on all of the Hawaiian Islands
Hawaiian Petrel – ‘u‘au

- Listed as Endangered by both U.S. & State of Hawai‘i
- Breeding populations exist on Kaua‘i, Maui, Lana‘i and Hawai‘i
The Princeville Resort Kauai
Malama the Shearwater Program

Bird friendly lighting program

• The Princeville Resort Kauai has changed out numerous traditional lighting fixtures with low wattage LED down-pointed shielded lights
• Seabird fallout season lighting protocols turn off or dim many additional lights on the property
• Window shades are being installed on several windows that lights shine out to the sea from – they will be lowered during the seabird fallout season
**Downed Seabird Recovery Program**

- The Princeville Resort Kauai has an extensive and very comprehensive downed seabird recovery program which works in close collaboration with the Island wide Save our Shearwater Program (SOS)
- The Princeville Resort Kauai hosts an SOS Shearwater Aid Station that birds from the Resort and surrounding entities are placed in and are then admitted into the SOS Program which cares for, rehabilitates, documents and releases the birds back into the wild
- Approximately 92% of the recovered seabirds are released back into the wild
Guest Education and Outreach

- The Princeville Resort Kauai has developed a seabird awareness and educational tri-fold brochure that will be placed in every guest room.
- Informational signs are being placed on the window louvers in guest rooms asking guests to keep their louvers closed after dark during the seabird fallout season.
- Princeville Resort Kauai has commissioned the creation of a children’s coloring book starring an ‘a‘o, monk seal and an albatross which tells the story of the seabird program.
- The Princeville Resort Kauai is currently creating a video about the seabird program at the Resort.
Associates Responsibilities

• While on the property be alert for downed seabirds, especially during the September 15 – December 15 peak fallout season
• If you find a downed bird report it to security immediately
• Do not touch the bird
• Standby until a security officer arrives
The Princeville Resort Kauai takes pride in our continued efforts to protect the natural resources on the Island.

Thank you for your attention to this presentation and your continued kōkua with this program.
If You Would Like More Information

- Please don’t hesitate to ask me about any questions you may have about the birds or the program
- My contact information is as follows:

  Reggie David
  (808) 329-9141 Office
  (808) 937-0124 Cell
  rdavid@ilhawaii.net email
The End
Advanced Downed Seabird Training
Modified Seabird Protocols

- Changes have been made to bird retrieval, photography, incident reporting and data management for the 2010 season – these changes primarily reflect the need to correctly identify the birds recovered to species level.

- These changes are due to new seabird behavior, changed circumstances and ongoing and changing wildlife regulatory processes and third party legal actions.

- These changes are in no way a reflection on the way that the security department responded to downed Seabird incidents over the past two years – you all followed the protocols of the day, and did a good job.

- I would like to thank you all very much for the way that you followed protocols, it made my job easier, and has provided some of the information which in part is driving the changes to seabird protocols for the 2010 season.
Downed Seabird Response Protocols

- Security will immediately respond to the scene with protective gloves, a clean towel, pet carrier and a digital camera
- Before touching the downed seabird take at least one photo of the scene showing the bird in situ
- Put on protective gloves
- Carefully wrap the bird in a clean towel, place in pet carrier
- Transport the bird to the Security office
- Summon assistance, and once there are two officers on hand remove the bird from the pet carrier and take at least two identification photographs of the animal (more on this a bit later)
- Place the bird in the Shearwater Aid Station
- Fill in the “Shearwater Aid Station” log and fill in and submit a security report
Downed Seabird Security Report

- Date and time that the downed seabird was first seen
- Exact location that the bird was found
- Who first noticed the bird
- Who responded
- Photograph identification numbers of the incident
- When was the bird recovered
- Confirmation that the Shearwater Aid Station log was filled out – note in your security report if you were unable to fill in the SAS log (rain, no pen etc.)
Seabird Reporting Loop

- Give a copy of the Downed Seabird Security Report to the Chief Engineer
- Data from the Security report will be entered into a database ASAP
- An updated “Downed Seabird” database along with documenting photographs will be transmitted electronically to the Program Biologist as rapidly as is feasible for confirmation of identification and monitoring of the data
Seabird Species Identification

Newell's Shearwater

Wedge-tailed Shearwater

Hawaiian Petrel
Newell’s Shearwater – ‘a‘o

- Listed as a threatened species by both the U.S. and State of Hawai‘i
- 80% of population nests on Kaua‘i
- Also breeds on Maui, Hawai‘i and possibly Molokai
Hawaiian Petrel – ‘u‘au

- Listed as Endangered by both U.S. & State of Hawai‘i
- Breeding populations exist on Kaua‘i, Maui, Lana‘i and Hawai‘i
Wedge-tailed Shearwater – ‘u‘aukani

- Protected under the federal MBTA
- Breeds on all of the Hawaiian Islands
Why is Correct Species Identification Important?

- In the past more than 95% of the seabirds downed on the resort property have been Newell’s Shearwaters which as you all know are listed as an endangered species.

- In the past we have also recovered one or two Hawaiian Petrels on property each year – this species is also listed as an endangered species.

- What is new is that over the past season approximately 20% of the birds we have recovered have been Wedge-tailed Shearwaters, which are not listed under either federal or state of Hawaii endangered species statutes.

- **Why is this change in bird behavior and recovery important to the Resort?**

  The simple answer is potential liability under the ESA and HRS 195D.
Current Regulatory Situation

- The Princeville Resort Kauai is one of 40 entities on Kaua‘i that have been contacted by both federal and state wildlife regulators over seabird issues.

- We along with many of those entities are actively participating in the Kaua‘i Seabird Habitat Conservation Plan – a program which, when complete will issue both federal and state permits to authorize “take” of listed seabird species.

- This plan requires that entities minimize their potential threat to these species to the maximum extent practicable – for any unavoidable take that occurs following the implementation of those measures, entities will need to pay a per bird fee.

- Currently the per bird fee for the two listed species being discussed is $10,000 per bird a year for the term of the permit, which is currently expected to be between 20 and 30 years.
Changes in Protocols to Meet These Needs

- Responders will take photographs of EVERY bird handled.
- Responders will take close-up identification photographs of EVERY bird handled.
- Responders will fill in the Shearwater Aid Station log for EVERY bird placed in the “Shearwater Aid Station”.
- Data and photographs will be transmitted electronically to the project biologist promptly.
Workshop Topics

● Cameras
  ■ Types
  ■ Resolution
  ■ Settings
  ■ Camera image numbering

● Moving birds & picture taking
  ● How do you do it now
  ● Pet carriers

● Data recording and reporting
  ● Camera image numbering
  ● Timelines on security reports
  ● Timelines on data entry and transmission to program biologist

● Other Issues
The Princeville Resort Kauai deeply appreciates the security departments lead on responding to downed seabirds and the continued professionalism of the department members.

We also deeply appreciate your ongoing input into improving a program that is as fundamental and important to the Resort as this one.
Appendix D - Typical seabird data recovery form
### Malama the Shearwater Log Sheet 2009

<table>
<thead>
<tr>
<th>No.</th>
<th>Report #</th>
<th>Species</th>
<th>Date</th>
<th>Time</th>
<th>Location</th>
<th>Photo</th>
<th>AID S #</th>
<th>Condition</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
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<td></td>
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</table>

- Photograph the Shearwater and surrounding area and attach to log sheet
- Log sheet is submitted to Director of Engineering the following morning. In the absence of the Director of Engineering submit to the AM MOD.
Appendix E – Seabird Season Lighting Protocols
Shearwater Light Procedures

September – December

1. Engineering – (Sep. 1st for season) Turn off 25% of parking lights or 5 approved light poles
2. Engineering – (Sep. 1st for season) Adjust Guard shack shielded lighting to point downward
3. Engineering – (Sep. 1st for season) Turn off up lights at Royal Palms
4. Engineering – (Sep. 1st for season) Turn off lights in Porte-cochere water feature
5. Engineering – (Sep. 1st for season) Turn off flood lights at Cooling Tower
6. Engineering – (Sep. 1st for season) Turn off flood lights at Flower shop
7. Engineering – (Sep. 1st Removed flood lights) St Regis Bar Lanai – turn off flood lights
8. Engineering – (Lower Daily after Sunset, Raise before Sunrise) Pull shades at 4th floor elevator lobby
9. Engineering – (Lower Daily after Sunset, Raise before Sunrise) Pull shades at Keiki club
10. Engineering – (Lower Daily after Sunset, Raise before Sunrise) Pull shades at 9th and 10th floor B1 wing
11. Engineering – (Sep. 1st for season) Turn off flood lights (3) at 3rd floor rooftop
12. Engineering – (Sep. 1st for season) Turn off soffit lights at 3rd floor elevator landing
13. Engineering – (Sep. 1st for season) Place shroud on all Turtle lights on first floor
14. Engineering – (Daily at 11:00pm) Turn off all Tiki torch lighting
16. Engineering/All – (Sep. 1st for season) Turn off florescent lights at Pool manager office and Kitchen area
17. Engineering/All - (Sep. 1st for season) Dim lights at lobby Piko (Ensure cleaners can not turn all lights on to 100% when cleaning in the evening.)
18. Engineering/All - (Sep. 1st for season) Dim lights at Kauai Grill (Ensure cleaners can not turn all lights on to 100% when cleaning in the evening.)
19. Engineering/All - (Sep. 1st for season) Dim lights at Makana Terrace (Ensure cleaners can not turn all lights on to 100% when cleaning in the evening.)
20. Engineering/All - (Sep. 1st for season) Dim lights at Nalu Kai and Pool activities desk (Ensure cleaners can not turn all lights on to 100% when cleaning in the evening.)
21. Engineering/All - (Sep. 1st for season) Dim lights at St Regis Bar (Ensure cleaners can not turn all lights on to 100% when cleaning in the evening.)
22. Engineering - (Sep. 1st for season) St Regis Bar – Replace cfl’s in floor lamps with 60 watt incandescent bulbs
23. Manager - St Regis Bar – (Sep. 1st for season) Turn off floor and table lamps after working hours
24. Rooms Division - (Sep. 1st for season) Distribute Shearwater letters at reception desk when Guests check-in.
25. Rooms Division - (Sep. 1st for season) Place Shearwater awareness signage in all Guestroom to keep lovers closed at night.
26. Rooms Division - (Sep. 1st for season) Place cards in Prince Junior Suites to turn off lights in bathrooms when not in use.
27. Human Resources – (Sep. 15th) Ensure all employees are trained on Shearwater awareness.
29. Security - (Sep. 1st for season) Security to check and document above procedures (during season) nightly to ensure all measures are in place.

_____________________________
Name

_____________________________
Signature
Appendix F – Typical guest newsletter
Welina Mai, Welcome to The St. Regis Princeville Resort!

ST REGIS EVENING RITUAL

Fridays in the St. Regis Bar 6:15 pm

The evening’s host will share the story of the ‘Oahi, the ancient fire throwing ceremony of Makana, the northwestern mountain peak that can be viewed from the resort and depicted in the St. Regis Bar Mural. The ‘Oahi was performed for the most esteemed celebrations. On the day of the ceremony skilled fire throwers climbed the steep cliffs to the top of Makana with dry logs of patapa or hau. The logs were lit and hurled out over the ocean. The updrafts created by the trade winds kept the firebrands aloft, soaring as far as a mile out to sea.

The evening ritual concludes with a dramatic champagne sabering. Enjoy live Hawaiian entertainment with Maluhia

KOKUA

Help protect Kauai’s native Shearwater birds

Kaua‘i is home to many species of seabirds that nest and raise their young in the mountain forests and in the coastal beach vegetation.

These seabirds include the Newell’s Shearwater, Hawaiian Petrel and Wedge-Tailed Shearwater. From September through December, when they leave their nests, seabird fledglings are guided by the light of the moon out to sea. Young seabirds, when traveling at night, can become disoriented by unshielded lights. The urbanization on Kauai has resulted in the ongoing fallout of fledgling on their first nocturnal flight from their nesting burrow to the ocean.

We at St. Regis Princeville Resort are doing what we can to help the young seabirds find their way to the ocean safely. As part of our commitment to help these seabirds find their way to the ocean safely, we ask that you close the guest room louvered window panels after dark to shield the indoor room lights. With your cooperation we can host a safe environment for our native birds. In addition if you should encounter a bird somewhere on our resort grounds, we ask that you do not handle the bird, but instead contact a member of our trained staff.

ARTISAN’S MARKETPLACE

Amy Christmas

Wednesdays 9:00 am - 5:00 pm
Coconut Fiber Baskets

Hawaiian Palm Baskets are handmade by Amy Christmas, here on Kauai. She has been creating and perfecting them for 12 years.

The baskets are assembled from a wealth of recycled local plant materials, the primary elements coming from an array of local palms. They are adorned with unique combinations of other indigenous plant parts including leaves, pods, fruits, and flowers.

The natural earth-tones accentuate any decor while the various sizes offer endless possibilities for display. They are gifts of aloha that reflect the beauty of the ‘Garden Isle’ and will truly be treasured by all who receive them.

Please join us in welcoming our honored guest Kupuna Dora Swain

Mondays 9:00 am - 12:00 pm

A kupuna is an honored elder who has acquired enough life experiences to become a family and community leader. The term has been recognized to be the embodiment of natural respect... a practitioner of aloha (love), pono (righteousness), malama (caring), and spirituality. Kupuna joins us on Mondays in the St. Regis Bar to share the many aspects of Hawaiian Culture.

*Since preparation of the brochure, the resort is no longer the St. Regis and is now the Princeville Resort Kauai.
Appendix G – Guest Seabird Conservation Program Brochure
I malama a I ho'opakele
I na manu 'aukai o Kaua'i

"To care and project Kaua'i seabirds."

Seabird Conservation Program
Kaua‘i is home to many species of seabirds that nest and raise their young in the mountain forests and in the coastal beach vegetation.

These seabirds include the Newell’s Shearwater, Hawaiian Petrel and Wedge-Tailed Shearwater. From September through December, when they leave their nests, seabird fledglings are guided by the light of the moon out to sea. Young seabirds, when traveling at night, can become disoriented by unshielded lights.

The urbanization on Kaua‘i has resulted in the ongoing fallout of fledgling seabirds on their first nocturnal flight from their nesting burrow to the ocean.

In 1980, the Department of Fish and Wildlife on Kaua‘i, established the “Save Our Shearwaters” program to aid these precious birds. The SOS program sets up collection aid stations during the fledgling season.

We at The St. Regis Princeville Resort are doing what we can to help the young seabirds find their way to the ocean safely. We volunteer each season as a host aid station site and proactively limit our exterior lighting throughout the resort and grounds. As part of our commitment to help these seabirds find their way to the ocean safely, we will close your louvered window panels during Turndown Service. We ask for your participation by keeping the louvers closed at night until you have turned off your lights for the evening.

If you should encounter a bird somewhere on resort grounds, we ask that you do not handle the bird, but instead contact a member of our trained staff.

Mahalo nui loa.
Appendix H – In room window louver seabird awareness rack card
Young Newell’s Shearwater birds travel at night to the ocean from September to December and can become disoriented by unshielded light. As part of our commitment to help these seabirds find their way to the ocean safely, we will close your louvered window panels during Turndown Service. We ask for your participation by keeping the louvers closed at night until you have turned off your lights for the evening.

With your cooperation we can host a safe environment for our native birds. Mahalo!
Appendix I – Prince Junior Suite bathroom lighting seabird awareness rack card
Young native Newell’s Shearwater birds travel at night to the ocean from September to December and can become disoriented by unshielded light.

We are committed to helping these endangered seabirds find their way to the ocean safely. We would appreciate you turning off the bathroom lights when not in use. We thank you for your cooperation and support of our Seabird Protection Program.
Appendix J – Young Voyagers Club coloring book - Cover and two typical pages
Who's that over there?
Aloha, My name is 'A'o (ah-oh). I'm a young Newell's shearwater.
When I learn to fly I do it at night. Sometimes I get distracted by a full moon or bright lights. I may get dizzy and fall to the ground. That's how I landed here.
September through December is the shearwater fledging season. That's when shearwaters learn to fly. At those times the hotel guests are asked to close their louvered window panels to shield their room lights.
Kauaʻi Seabird Habitat Conservation Program (KSHCP)

Participant Inclusion Plan (PIP)

Essex House Condominium Corporation, an affiliate of Marriott International, Inc. (Kauaʻi Marriott Resort, Lihue)
**PART 1: Landowner & Property Information; Description of the Facilities; Avoidance & Minimization Measures; Monitoring of Take**

**Item 1.** Provide the name of the landowner, business, agency, or institution and complete contact information. If the applicant/participant is different from the landowner, please attach power of attorney (or other documentation) allowing the party to act on the landowner’s behalf.

<table>
<thead>
<tr>
<th>Participant/Applicant Name:</th>
<th>Essex House Condominium Corporation, an affiliate of Marriott International, Inc. (herein “Kaua‘i Marriott Resort”)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Address/Location of Facility:</td>
<td>3610 Rice Street, Lihue, HI 96766</td>
</tr>
<tr>
<td>Mailing Address:</td>
<td>Same as above</td>
</tr>
</tbody>
</table>
| Primary Contact: | Paul Toner  
General Manager |
| Address: | Kaua‘i Marriott Resort  
3610 Rice Street  
Lihue, HI 96766 |
| Alternate Contact: | Kaupena Kinimaka  
Area Director of Global Safety & Security |
| Address: | Kaua‘i Marriott Resort  
3610 Rice Street  
Lihue, HI 96766 |
| Preparer Contact: | Lisa A. Bail, Esq.  
Counsel for Kaua‘i Marriott Resort |
| Address: | Goodsill Anderson Quinn & Stifel  
999 Bishop Street, Suite 1600  
Honolulu, HI 96813 |
| Telephone: | (808) 547-5787  
lbail@goodsill.com |
Preparer Alternate Contact: Reginald David
Consultant for Kaua’i Marriott Resort

Address: Rana Biological Consulting, Inc.
P. O. Box 1371
Kailua-Kona, HI 96740

Telephone: (808) 937-0124

Email: dvidr003@hawaii.rr.com
Item 2. Provide the legal description of the property at which the existing facilities and Covered Activities are located, including Tax Map Key (TMK) number. Provide a survey of the property and site plan drawings showing the locations of the Covered Activities (lights), property boundaries, buildings & structures, and site features. If properties containing the Covered Activities comprise separate parcels please include all Tax Map Key numbers and maps.

The Kaua’i Marriott Resort is located at a physical street address of 3610 Rice Street, Lihue, HI 96766. The resort encompasses tax map keys numbered sequentially from 3-500-2002-0001 to 3-500-2002-0614 totaling 614 tax map keys. Copies of these TMKs maps are included in Appendix A, and a site plan is included in Appendix B. Lighting location is indicated in Table 1 below.

Item 3. Describe the existing Covered Activities for which incidental take authorization is sought. Include list of buildings, type and description of lights present, purpose and location of lights and current seabird lighting accommodation in place (e.g. shielding, downward pointing, switched off during fledging season etc). For “Types of lights” please use the following categories:

- Parking Lights
- Signage Illumination
- Wall-pack Building Lights
- Landscaping/Grounds/Accent/Bollards
- Indoor lights visible from outdoors
- Roof Floodlights
- Other Lights

Facility lighting plan may be submitted as lighting inventory. Photos may be attached. The suggested light table, and Green Sea Turtle assessment table below may each be modified as needed to provide the necessary information.

The Kaua’i Marriott Resort consists of a hotel and typical resort amenities lighting located in Nawiliwili fronting Kalapaki Beach. The property covers 41 acres of which the buildings comprise approximately 6.4 acres. Outdoor lighting includes lighting for the parking lots & delivery areas, grounds, buildings, and walkways. The property is landscaped throughout. Table 1 below provides the outdoor lighting at the Resort. The Avoidance and Minimization Plan (item 7) addresses light attraction.
# Table 1: Outdoor Lighting at Kaua‘i Marriott Resort

<table>
<thead>
<tr>
<th>Light Type Make and Model</th>
<th>Wattage/rating</th>
<th>Bulb Color</th>
<th>Quantity</th>
<th>Location</th>
<th>Purpose</th>
<th>Cut-off or Shielded Fixture</th>
<th>Light angle (down, out, up)</th>
<th>Visible from Beach (yes/no)</th>
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<tbody>
<tr>
<td><strong>Parking lot pole lights</strong></td>
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<tr>
<td>Stonco/Flood 150w HPS-High Pressure Sodium</td>
<td>2100 k</td>
<td>33</td>
<td>Employee, Valet/Haupu</td>
<td>Parking lot illumination</td>
<td>Yes</td>
<td>Down</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Lithonia/Flood 250w HPS</td>
<td>2200 k</td>
<td>12</td>
<td>Valet and Guest Lots</td>
<td>Parking lot illumination</td>
<td>Yes</td>
<td>Down</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Lithonia/Flood Q500-Quartz 500w</td>
<td>3000 k</td>
<td>5</td>
<td>Service Road</td>
<td>Parking lot illumination</td>
<td>Yes</td>
<td>Down</td>
<td>No</td>
<td></td>
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<tr>
<td>Kim/Vista 45W incandescent</td>
<td>2700 k</td>
<td>6</td>
<td>Service road</td>
<td>Parking lot illumination</td>
<td>Yes</td>
<td>Down</td>
<td>No</td>
<td></td>
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<tr>
<td>Lithonia/Flood 23w LED</td>
<td>5000 k</td>
<td>9</td>
<td>Service Road, Dukes Pkg.</td>
<td>Parking lot illumination</td>
<td>Yes</td>
<td>Down</td>
<td>No</td>
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<tr>
<td>Antique Street Lights/Flood 100w MH-Metal Halide</td>
<td>4000 k</td>
<td>4</td>
<td>Associate Crosswalk</td>
<td>Pedestrian Safety</td>
<td>Yes</td>
<td>Down</td>
<td>No</td>
<td></td>
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<tr>
<td>Lithonia/Flood 250w MH</td>
<td>4000 k</td>
<td>2</td>
<td>Dukes, Valet Pkg.</td>
<td>Pedestrian Safety</td>
<td>Yes</td>
<td>Down</td>
<td>No</td>
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<tr>
<td>Lithonia/Flood 114w LED</td>
<td>4000 k</td>
<td>1</td>
<td>Haupu Parking - gravel</td>
<td>Pedestrian Safety</td>
<td>Yes</td>
<td>Down</td>
<td>No</td>
<td></td>
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<tr>
<td>Lithonia/Flood 13w LED</td>
<td>2700 k</td>
<td>8</td>
<td>Pali Cottage Sidewalk</td>
<td>Pedestrian Safety</td>
<td>Yes</td>
<td>Down</td>
<td>No</td>
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<tr>
<td>RAB/Flood 40w LED</td>
<td>4000 k</td>
<td>1</td>
<td>Lower Pali Kai</td>
<td>Pedestrian Safety</td>
<td>Yes</td>
<td>Down</td>
<td>Yes</td>
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<tr>
<th><strong>Signage illumination</strong></th>
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<tbody>
<tr>
<td>Lithonia/Flood F032T8 Florescent 32w</td>
<td>4100 k</td>
<td>1</td>
<td>Porte Cochere entry</td>
<td>Signage</td>
<td>No</td>
<td>Out, but low to ground</td>
<td>No</td>
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KSHCP-PIP Kauai Marriott Resort

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<table>
<thead>
<tr>
<th>Light Make and Model</th>
<th>Wattage/rating</th>
<th>Bulb Color</th>
<th>Quantity</th>
<th>Location</th>
<th>Purpose</th>
<th>Cut-off or Shielded Fixture</th>
<th>Light angle (down, out, up)</th>
<th>Visible from Beach (yes/no)</th>
</tr>
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<tr>
<td>Kim Vista</td>
<td>13.5w LED Flood</td>
<td>2700 k</td>
<td>6</td>
<td>Rice Street sign</td>
<td>Signage</td>
<td>No</td>
<td>Out, low to ground</td>
<td>No</td>
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<tr>
<td>Kim Vista</td>
<td>13.5w LED Flood</td>
<td>2700 k</td>
<td>18</td>
<td>Promenade/Beach/Main drive</td>
<td>Signage</td>
<td>No</td>
<td>Out, but low to ground</td>
<td>4 Yes (Dukes/Porto Fino signs on Promenade)</td>
</tr>
<tr>
<td>Electro Elf/ Flood</td>
<td>PL13 Florescent 13w</td>
<td>2700 k</td>
<td>3</td>
<td>Promenade/Beach</td>
<td>Signage</td>
<td>Yes</td>
<td>Down</td>
<td>Yes</td>
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<tr>
<td>Lithonia/ Flood</td>
<td>Q500-Quartz 500w</td>
<td>3000 k</td>
<td>3</td>
<td>Bake shop ramp, Service Road</td>
<td>Building lights</td>
<td>Yes</td>
<td>Down</td>
<td>No</td>
</tr>
<tr>
<td>Electro Elf/ Flood</td>
<td>PL13 CFL 13w</td>
<td>2700 k</td>
<td>22</td>
<td>Aupaka’s Planter, Dukes Walkway, Pool Hut, Service Road</td>
<td>Building lights</td>
<td>Yes, under eaves</td>
<td>Down</td>
<td>8 Yes (Aupaka’s Planter – Distant)</td>
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<tr>
<td>Kim/Vista</td>
<td>13.5w LED Flood</td>
<td>2700 k</td>
<td>5</td>
<td>Dukes Parking, Service Rd</td>
<td>Building lights</td>
<td>Yes</td>
<td>Down</td>
<td>No</td>
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<tr>
<td>Lithonia/Flood</td>
<td>23w LED</td>
<td>4000 k</td>
<td>11</td>
<td>Service Road, Dukes Pkg., Garden</td>
<td>Building lights</td>
<td>Yes</td>
<td>Down</td>
<td>No</td>
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<tr>
<td>Lithonia/Flood</td>
<td>26w LED</td>
<td>4000 k</td>
<td>3</td>
<td>Security Entrance</td>
<td>Building lights</td>
<td>Yes</td>
<td>Down</td>
<td>No</td>
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<tr>
<td>Stonco/Flood</td>
<td>100w HPS-High Pressure Sodium</td>
<td>2700 k</td>
<td>5</td>
<td>Dukes parking Storage buildings at the service road</td>
<td>Building lights</td>
<td>Yes</td>
<td>Down</td>
<td>No</td>
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<tr>
<td>Leviton Fluorescent</td>
<td>F17/T8</td>
<td>4100 k</td>
<td>24</td>
<td>In Stair handrails</td>
<td>Building lights</td>
<td>Yes</td>
<td>Down</td>
<td>Yes (Distant)</td>
</tr>
<tr>
<td>Landscaping &amp; grounds accent floodlights</td>
<td></td>
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<tr>
<td><strong>Kim/Vista</strong></td>
<td>2P3819 CFL 19w</td>
<td>2700k</td>
<td>127</td>
<td>Main &amp; Haupu Drive</td>
<td>Landscape illumination; accent lighting</td>
<td>Shielded by thick vegetation</td>
<td>out</td>
<td>No</td>
</tr>
<tr>
<td><strong>Kim/Vista</strong></td>
<td>HR175- Mercury Vapor 175w</td>
<td>4000k</td>
<td>17</td>
<td>Promenade, Dukes, Kahili garden</td>
<td>Landscape illumination; accent lighting</td>
<td>Yes</td>
<td>Down</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Kim/Vista</strong></td>
<td>Par 38 13.5w LED Flood</td>
<td>2700k</td>
<td>17</td>
<td>Pool/ Promenade, beach, Dukes, Porte Cochere</td>
<td>Landscape illumination; accent lighting</td>
<td>No</td>
<td>Down, some up but shielded by vegetation</td>
<td>2 Yes 15 No</td>
</tr>
<tr>
<td><strong>FEIT/String Lights</strong></td>
<td>11w incandescent</td>
<td>2000k</td>
<td>100</td>
<td>Kukui’s Patio Trees</td>
<td>accent lighting</td>
<td>Yes - vegetation</td>
<td>Out</td>
<td>Yes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bollards</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vista</strong></td>
</tr>
<tr>
<td><strong>Electro Elf/ Flood</strong></td>
</tr>
<tr>
<td><strong>BQL/ Pagoda</strong></td>
</tr>
<tr>
<td><strong>Electro Elf/ Pagoda</strong></td>
</tr>
<tr>
<td><strong>Lithonia, Stonco/Flood</strong></td>
</tr>
<tr>
<td><strong>Kim/Vista</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bollards</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stonco/Flood</strong></td>
</tr>
</tbody>
</table>
The above description of outdoor lighting is current as of December 2018. The Resort has minimized lighting to the maximum extent practicable.

<table>
<thead>
<tr>
<th>Lights Type</th>
<th>Energy Source</th>
<th>Wattage</th>
<th>Temp</th>
<th>Area Description</th>
<th>Office of Pedestrian Safety and Adventure</th>
<th>Downlight</th>
<th>Shielded or Small Wrap Around</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lithonia/Flood</td>
<td>50w LED</td>
<td>4000k</td>
<td>2</td>
<td>BBQ area, Lower Pali Kai walkway</td>
<td>Yes</td>
<td>Down</td>
<td>No</td>
</tr>
<tr>
<td>Kim/Vista</td>
<td>Par38 13.5w LED</td>
<td>2700k</td>
<td>8</td>
<td>Kahili Garden</td>
<td>No - heavy vegetation</td>
<td>Out</td>
<td>No</td>
</tr>
<tr>
<td>Antique Street Lights</td>
<td>13w LED</td>
<td>2700k</td>
<td>4</td>
<td>Associate Crosswalk</td>
<td>Yes</td>
<td>Out, Shielded by</td>
<td>No</td>
</tr>
</tbody>
</table>

**Other Lights**

<table>
<thead>
<tr>
<th>Lights Type</th>
<th>Energy Source</th>
<th>Wattage</th>
<th>Temp</th>
<th>Area Description</th>
<th>Office of Pedestrian Safety and Adventure</th>
<th>Downlight</th>
<th>Shielded or Small Wrap Around</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lithonia/Spot</td>
<td>120w Par 64 incandescent 6V</td>
<td>2700k</td>
<td>4</td>
<td>Promenade, garden</td>
<td>No</td>
<td>Down</td>
<td>2 Yes (Promenade) 2 No (Garden court)</td>
</tr>
<tr>
<td>Pentair, enclosed</td>
<td>13.5 LED</td>
<td>3000k</td>
<td>30</td>
<td>Pool lights in swimming pool</td>
<td>User Safety</td>
<td>Out</td>
<td>No</td>
</tr>
</tbody>
</table>

The above description of outdoor lighting is current as of December 2018. The Resort has minimized lighting to the maximum extent practicable.
Table 2: Green Sea Turtle Assessment for the Site & Facility

Please provide the information requested below to help determine if measures to avoid impacts to the Green Sea Turtle(s) from the effects of light attraction are required to be implemented at any of the facility(s), parcel(s), or site(s) included in this PIP. Please consult with staff from the DLNR and the USFWS to arrange a site visit, if needed, discuss measures to avoid impacts to the Green Sea Turtle, and provide further guidance.

<table>
<thead>
<tr>
<th>Question</th>
<th>YES / No</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are any of the facilities located adjacent to a beach?</td>
<td>YES/ No</td>
<td>If yes, provide length of beach frontage &amp; brief description of facilities &amp; lights adjacent to the beach. Kalapaki Beach is approximately ¼ mile long and is located fronting the swimming pool, but separated from the Resort proper by a paved walkway. Facilities adjacent to the beach include the pool, pool restaurant, pool activity desk and pool walkway, restaurants and hotel structures.</td>
</tr>
<tr>
<td>Are any of the Covered Activities (lights) visible from a beach?</td>
<td>YES / No</td>
<td>If yes, describe the specific lights (type, , height, purpose) &amp; specific location; provide map &amp; photos showing distance from beach. See Table 1 above</td>
</tr>
<tr>
<td>Have green sea turtles been known to nest on any beaches adjacent to the facilities?</td>
<td>Yes / NO</td>
<td>If yes, provide information about nesting occurrences, if known, including location and date and any other information.</td>
</tr>
</tbody>
</table>
Item 4. If applicable, describe any lighting standards (e.g., foot candles/area) required for facility operations or other requirements that necessitate the use of lighting (e.g., required for security, safety, operations). Describe the relevant standard, or regulation, and the areas and Covered Activities at the site (e.g., type of lighting) to which it applies.

Marriott's standards for light fixtures are 1 foot candle (10) lux for parking lots, and 2 foot candle (20) lux for hallways. Aside from these requirements, there are no specific lighting standards, rules, restrictions or requirements that the Resort must comply with, beyond assuring that lighting is adequate to ensure guest and employee safety and security. Pre-seabird season lighting audits are conducted by a seabird biologist and necessary tweaks to the lighting are completed prior to the start of the seabird season each year.

Item 5. Describe any plans/proposals for future facilities or expansion of existing facilities. Include any proposed structures and lighting by type, purpose, and location. Plans (architecture and site plans), photos, and drawings can be attached.

Kaua’i Marriott has no plans for the future on the books that would cause us to install extra interior or exterior lights.

Item 6. Pursuant to the Endangered Species Act (ESA), Section 10 (a)(2)(A)(iii), describe alternatives to avoid the taking considered and evaluated. Provide reasons why those alternatives are not being utilized. Alternatives can include operational or facility design changes (attach pages as needed). The tables below may be altered as needed.

Activities that the Kaua’i Marriott Resort has direct control over that may result in covered species landing on the property are restricted to those associated with lighting. Other programs that the Resort implements that result in benefits to seabirds include increased staff training, guest outreach (brochures go into guest rooms during seabird fledging seasons, and monitoring and rapid recovery of downed seabirds (Appendix C). The Resort has addressed all of these issues to the maximum extent practicable. Measures and protocols implemented are detailed in the following sections of the application.

In the following table light attraction avoidance and minimization alternatives that were analyzed are presented.
## Table 3: Light Attraction Alternatives to the Taking

<table>
<thead>
<tr>
<th>Artificial Light Attraction Alternatives to the Taking Considered</th>
<th>Reasons Alternatives are not Being Utilized (provide justification)</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Deactivate all outdoor artificial lights from dusk to dawn during the fledgling fall-out season September 15 to December 15</td>
<td>Lighting is required for direction, safety, and security of the hotel grounds for guests, visitors, and employees.</td>
</tr>
<tr>
<td>▪ Change operations to eliminate the need for outdoor artificial lighting (e.g., from nighttime to daylight hours)</td>
<td>Guest and staff safety and security, precludes this option. To do this the hotel would need to be closed at night, which is not a viable business option.</td>
</tr>
<tr>
<td>▪ Shield all lights from visibility from the beach, or screen all Green Sea Turtle nests, from May 15 to December 15 to avoid impacting the green sea turtle (Green Sea Turtle)</td>
<td>Lights are shielded and the beach is dark. Some beach lighting is required for is required for direction, safety, and security of the beach for guests, visitors, and employees.</td>
</tr>
<tr>
<td>▪ Other alternatives to the taking considered, if any. If facility is proposed, include alternative designs considered</td>
<td>The resort has replaced a very large number of lights on and in the resort to reduce the amount of stray light being produced. Window blinds or curtains have been placed in rooms in the resort reducing the visible lighting from outside the hotel. Windows have been tinted. Bulbs have been reduced in lumens over the past 10 years. All upward pointing lights have been removed or are turned off during seabird fledging season.</td>
</tr>
</tbody>
</table>
Item 7. Describe all site-specific seabird minimization measures considered for the Covered Activities. This item should follow KSHCP minimization objectives and measures as specified in Appendix E (Guidelines for Adjusting Lighting at Facilities) of the KSHCP document. Please consult with staff from the DOFAW and the USFWS as needed. The suggested tables below can be altered as needed.

Minimization measures modify the Covered Activities to reduce the effects of the activity on the Covered Species. KSHCP Participants will be required to implement minimization measures that apply to the facility to the “maximum extent practicable” per applicable state and federal laws which regulate incidental take license/permit issuance by the DLNR and the USFWS.

Minimization also entails searching and recovering grounded seabirds to minimize the chance of mortality. In addition, the presence of on-site predators (i.e. feral cats, dogs) should be controlled and removed because these animals can prey on grounded seabirds.

Provide justification, such as policies, regulations, or other rationale for measures that will not be implemented.
<table>
<thead>
<tr>
<th>Minimization Measures Considered</th>
<th>Feasible? (Y / N)</th>
<th>If not Feasible to Implement Measures, Provide Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Change time of light use (lights off earlier)</td>
<td>YES / No</td>
<td>Facility operates at all hours and grounds safety is required.</td>
</tr>
<tr>
<td>▪ Deactivate unnecessary lights</td>
<td>YES / No</td>
<td></td>
</tr>
<tr>
<td>▪ Replace all outdoor lights with full cut-off fixtures</td>
<td>YES / No</td>
<td>Except very low to ground and shielded by vegetation.</td>
</tr>
<tr>
<td>▪ Shield all outdoor lights with full cut-off shields</td>
<td>YES / No</td>
<td>Except very low to ground and shielded by vegetation.</td>
</tr>
<tr>
<td>▪ Angle all lights downward</td>
<td>YES / No</td>
<td>Except very low to ground and shielded by vegetation.</td>
</tr>
<tr>
<td>▪ Lower intensity (lumens) of outdoor lights</td>
<td>YES / No</td>
<td></td>
</tr>
<tr>
<td>▪ Change bulb color to non-white spectrum</td>
<td>YES / No</td>
<td></td>
</tr>
<tr>
<td>▪ Prohibit/control unleashed predatory animals; prohibit outdoor feeding of animals; require sealed rubbish containers</td>
<td>YES / No</td>
<td></td>
</tr>
<tr>
<td>▪ Provide Worker Seabird Awareness Training to staff</td>
<td>YES / No</td>
<td>See Item 6, above, and Appendix C (Standard Operating Procedure).</td>
</tr>
<tr>
<td>▪ Provide outreach materials to staff &amp; guests</td>
<td>YES / No</td>
<td>See item 6, above, and Appendix D (guest brochure).</td>
</tr>
<tr>
<td>▪ Host Save Our Shearwaters (SOS) Aid Station</td>
<td>YES / No</td>
<td></td>
</tr>
</tbody>
</table>
Item 8. Minimization Plans. Provide a plan to minimize the effects to the Covered Seabirds due to the Covered Activities. KSHCP Participants will be required to minimize the effects of the Covered Activities to the “maximum extent practicable” per applicable state and federal laws which regulate take license/permit issuance. The KSHCP document provides minimization objectives and measures to follow.

The Minimization Plans should include the proposed minimization measures, timeline, and estimated cost for each facility. In this item, the Participant can include measures already completed or in place (new lights, shields, operational changes). Timeline should include estimated completion schedule, and annual schedule for minimization that will occur only during fledging season.

Minimization measures not yet determined but anticipated to occur at the facility; this section should include an estimated cost that will be earmarked for future minimization measures.

If applicable, the participant must provide the reasoning why certain measures will not be implemented. The suggested table below may each be altered to best describe the Minimization Plan. Attach additional pages, photos, and drawings as needed.

Starting in 2003, as the KSHCP staff was beginning outreach on seabird light attraction issues, lights were modified through shielding, down pointing, tinting guest room windows and other means, to help reduce impacts to seabirds. Thus, most of the specifics outlined in the Avoidance and Minimization Plan below have already been in place for 10+ years, and the Kauai Marriott is committed to continue managing their lights to reduce light attraction issues.

The foregoing avoidance and minimization measures were implemented, and costs associated with implementing these measures have already been incurred.

A biologist will accompany the head of loss prevention and the engineering department to conduct a lighting audit of the entire property prior to the onset of the seabird fallout season annually. The biologist will follow up with the Resort to ensure that any lighting minimization modifications that the biologist identified have been implemented. The biologist will also check the hotel several times during the season without notifying the Resort to ensure that all measures are in place. The biologist monitors will monitor the fallout season in real time and returns to the Resort if anything shows up in the fallout data that suggests that there may be a problem with the lighting minimization measures.
## Table 5: Lighting Minimization Measures

<table>
<thead>
<tr>
<th>List of Buildings</th>
<th>Minimization Measures</th>
<th>Cost to Implement</th>
<th>Responsible Staff</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parking lot lights (66)</td>
<td>Lights are full cut-off fixtures; lights are down directed; poles are minimum height (25 feet)</td>
<td>N/A</td>
<td>Engineering</td>
<td>Completed</td>
</tr>
<tr>
<td>Signage lights (36)</td>
<td>Lights are downward angled; lights are low to ground (1-2 ft.); lights are low wattage</td>
<td>N/A</td>
<td>Engineering</td>
<td>Completed</td>
</tr>
<tr>
<td>Wall-pack lights (36)</td>
<td>Lights are angled down; lights are shielded (either by eaves overhang or retrofit shields)</td>
<td>N/A</td>
<td>Engineering</td>
<td>Completed</td>
</tr>
<tr>
<td>Landscaping &amp; grounds lighting (321)</td>
<td>Most grounds and accents lights directed downward; others shielded by vegetation; grounds lights low to ground.</td>
<td>N/A</td>
<td>Engineering</td>
<td>Completed</td>
</tr>
<tr>
<td>Individual guest room interior lights</td>
<td>Avoidance Measures</td>
<td>N/A</td>
<td>Security</td>
<td>Completed</td>
</tr>
<tr>
<td></td>
<td>1. Encourage guests to switch off unnecessary room lighting. See Appendix D (guest brochure). The hotel also places an awareness poster in the lobby during seabird seasons.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Encourage guests to cover room windows at night during fallout season Minimization Measures.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1. All guest room windows were tinted to reduce amount of light visible from the exterior.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Table 6: Seabird Mortality Minimization Plan

<table>
<thead>
<tr>
<th>Minimization Measures</th>
<th>Describe minimization method (e.g. trapping, outreach, enact policy)</th>
<th>Cost to Implement</th>
<th>Responsible Staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remove &amp; control loose predatory animals at the facility. (Loose animals can kill grounded seabirds and this measure aims to prevent seabird mortality by animals.)</td>
<td>The resort implements this measure, except as noted in Table 4, above. The resort deploys cat traps as needed.</td>
<td>N/A</td>
<td>Grounds department</td>
</tr>
<tr>
<td>Prohibit outdoor feeding of predatory animals. (Feeding animals attracts them to the site and this measure aims to reduce the presence of animals that can cause seabird mortality.)</td>
<td>The resort implements this measure, except as noted in Table 4, above. Staff is trained that this is not allowed, and security monitors compliance</td>
<td>N/A</td>
<td>Management staff.</td>
</tr>
<tr>
<td>Conduct searches to recover downed birds at the property &amp; turn them into SOS following protocols (see monitoring plan below).</td>
<td>See Item 9 below.</td>
<td>N/A</td>
<td>Engineering, grounds and security staff.</td>
</tr>
<tr>
<td>Train staff to follow minimization measures.</td>
<td>See Item 9 below, and Appendix C.</td>
<td>N/A</td>
<td>Management staff.</td>
</tr>
</tbody>
</table>
Item 9. Take Monitoring Plan. Provide a plan to monitor take of the Covered Seabirds at the facilities proposed to be covered by the incidental take permit/license. The take monitoring plan describes how the property will be searched for downed Covered Seabirds. The KSHCP document provides standards and guidelines for take monitoring to ensure that take of the species is accurately measured and recorded.

The regulatory agencies will make the final determination as to the adequacy of the take monitoring plan.

In 2008, the Marriott developed a Standard Operating Procedures (SOP) for patrolling, monitoring, documenting and reporting downed seabirds during the fledgling flight season (see Appendix D, SOP attachment). This document was updated in 2011, 2014, and 2019. The General Manager, or designee, will continue to update the SOP as needed during the KSHCP permit term, to reflect best practices for finding, recovering and documenting any downed seabirds.
<table>
<thead>
<tr>
<th>Item</th>
<th>Protocol (fill in protocol &amp; provide reasons)</th>
<th>KSHCP Guideline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage of the total property that will be searched &amp; the total area to be searched</td>
<td>The entire built upon portion of the property is inspected each day year round. Rooftops are checked by engineering, housekeepers check balconies, and grounds are checked by security and groundskeepers. Groundskeepers also check shrubbery and bushes (laua’e fern and naupaka). All open areas are visually checked by all associates and guests.</td>
<td>Search as much area as possible</td>
</tr>
<tr>
<td>Frequency of searches (# per day or per week)</td>
<td>At least once a day for all built-upon areas, more frequently for other areas.</td>
<td>Twice daily</td>
</tr>
<tr>
<td>Time of day of searches</td>
<td>Inspections are conducted throughout the day.</td>
<td>2-3 hours after sunset, and within 3 hours after sunrise</td>
</tr>
<tr>
<td>Number of searchers per search area</td>
<td>The entire staff, amounting to some 400 or more employees.</td>
<td>Depends on site conditions and safety considerations and vegetation, nearby hazards/threats</td>
</tr>
<tr>
<td>Proposed training</td>
<td>See Items 7 and 9 above, and Appendix C.</td>
<td>Annual training covering seabird identification, seabird handling, response procedures, verified and documented</td>
</tr>
</tbody>
</table>
Item 10. Components of the Green Sea Turtle Minimization and Monitoring Plan (if required). Monitoring and minimization for the Green Sea Turtle is in two parts: A) Monitoring to detect nests and B) Monitoring and minimizing impacts to nests detected.

Part A: Monitoring to detect Green Sea Turtle Nests
Please provide the following information; the table below may be used and altered as needed.

1) Detailed location and description of beaches, including linear distance, at which searching for nests of the green sea turtle will take place. Searches should take place at any beach from which light at the facility can be viewed;

2) Monitoring protocols indicating:
   a) Annual training of searchers;
   b) Frequency of searches;
   c) Conduct active searching (searching the beach width);
   d) Sufficient number of trained searchers to cover the area; and
   e) Record results of search monitoring.

3) All Participants are required to record the results of search efforts. Records should provide:
   a) Evidence (what was seen). Include description and provide photographs
   b) Location on the beach (GPS) and physically mark the location if possible
   c) Date and time of day
   d) Description of surrounding land use (e.g., vacant, or developed), and
   e) Proximity to the facility.

Part B: Monitoring of Identified Green Sea Turtle Nests

Each identified nest of the green sea turtle should be monitored and protected from light attraction. Please provide the following monitoring protocols; the tables below may be used and altered as needed.

1. Light avoidance measure for identified nests (either shield/deactivate lights at the facility or install and maintain a light shield around each identified nest);
2. Frequency of searches;
3. Number of searches monitoring the nests. The number of needed to monitor active nests will depend on number of nests identified and amount of beach needed to be covered;
4. Record the results of nest monitoring. Monitoring should provide:
   a. Evidence of hatchling emergence (description and photos):
   b. Date and time of emergence,
   c. Direction of tracks
   d. Condition of the nest area (e.g., disturbed or not).
<table>
<thead>
<tr>
<th>Item</th>
<th>Protocol (fill in protocol &amp; provide reasons)</th>
<th>KSHCP Guideline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location &amp; description of the beach, or beaches, surveyed and the linear distance of the beach.</td>
<td>Kalapaki Beach is approximately a quarter mile long and is located directly in front of the pool.</td>
<td>Beach area surveyed should coincide with visibility from the facility with the lights.</td>
</tr>
<tr>
<td>Frequency of searches (# per day or per week)</td>
<td>Groundskeepers rake the beach twice a week.</td>
<td>Weekly during nesting season (typ. May 15 to end of August)</td>
</tr>
<tr>
<td>Number of searchers per search area</td>
<td>One groundskeeper rakes the beach</td>
<td>Depends on site conditions and safety considerations</td>
</tr>
<tr>
<td>Proposed training</td>
<td>N/A. The hotel has never had nesting turtles on the beach.</td>
<td>Searchers should receive annual training conducted by the DLNR or the USFWS, or their designee.</td>
</tr>
<tr>
<td>Item</td>
<td>Protocol (fill in protocol &amp; provide reasons)</td>
<td>KSHCP Guideline</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Frequency of checks (# per day or per week)</td>
<td>N/A there has never been a nest recorded on Kalapaki beach since the hotel has been in operation. Should a nest be discovered the Resort would immediately contact USFWS and follow their standard Hawaii protocols for protecting the nest.</td>
<td>Active nests should be monitored every 1-2 days; then daily during expected hatching date</td>
</tr>
<tr>
<td>Light avoidance</td>
<td>N/A</td>
<td>If lights cannot be deactivated or shielded from the nest, each nest should be screened from visible light.</td>
</tr>
<tr>
<td>Number of searchers per search area</td>
<td>N/A</td>
<td>Depends on site conditions and safety considerations</td>
</tr>
</tbody>
</table>
Item 11. Describe the schedule that will be followed to provide training for staff. Training must be provided to those that will conduct and oversee the searches at the facility.

The training should include:

1. Summary of regulations protecting the Covered Species;
2. Search procedures, route, frequency and timing specific to the facility’s monitoring plan, for seabirds and green sea turtle nests (if applicable);
3. Response procedures including safe and proper techniques for handling seabirds;
4. Recognizing evidence of green sea turtle nests, proper nest light screening, and hatchling activity (if green sea turtle minimization and monitoring plan is applicable);
5. Procedures to document the results of searches;
6. Downed wildlife agency contacts; and
7. Nearest SOS aid station.

The Division of Forestry and Wildlife provided annual Worker Seabird Awareness and Response Training (WSART) to the appropriate facility staff prior to the start of each seabird fallout season from 2003 to 2017. Worker training will continue under the KSHCP for the duration of the permit term. Seabird Awareness Training will be conducted by a trained biologist in 2019, and in subsequent years, the training will be conducted by the Director of Global Safety & Security. The fallout season occurs each year from September 15 to December 15. The training includes: regulatory setting, consequences for noncompliance, standard monitoring, response, and reporting procedures, techniques for proper handling of downed seabirds, personal protection, agency contacts and facility locations.

Seabird Awareness and Response Training will be provided to the following staff:

- Engineering
- Director of Global Safety & Security;
- Security Personnel;
- Grounds Crew;
- Any staff tasked with outdoor work around the properties

A copy of the PowerPoint training module is attached as Appendix C. See also Standard Operating Procedures (SOP) (Appendix D).
Item 12. Describe any outreach conducted (e.g., handing out pamphlets on seabird awareness to facility employees or guests, etc.):

The Kaua‘i Marriott Resort has been doing outreach to staff and guests since 2003, and will continue to do so during the KSHCP permit term. During the seabird fledging season Kauai Marriott Resort will:

1. Display SOS informational posters in break rooms and common staff areas.
2. Put it in our “Discovery Page” which is our daily hotel newsletter for all Employees.
3. Staff will attend the annual Worker Seabird Awareness Training.
4. Remind staff about seabirds during department stand up meeting (pre-shift meetings) to bring additional awareness.
5. Talk about it in our Monday, Wednesday, and Friday Managers weekly stand up meetings.
6. Invite a qualified biologist to speak at our staff meeting.
7. Display SOS informational posters in the lobby to promote guest awareness.
8. Have an informational flyer put into each room as awareness to for our guest, asking them to keep curtains closed during the season. See Appendix E.
PART 2. Take Estimate, Requested Amount of Take Authorization, and Funding

Item 1. Show the calculation of estimated take for each of the Covered Species.

Following the take estimation methods in the KSHCP for estimating a Participant’s take (Section 6.2.2), the tables below show the take estimate calculation for the facility(s) for each of the Covered Seabirds.

The KSHCP take estimate method utilizes the average of the most recent 5 years of SOS recovery data for the facility. Applied to the data is an adjustment for downed birds not found, based on a 50% discovery rate and an adjustment based on SOS mortality (birds dead on arrival or those that die in care) – average SOS mortality is 12%.

If the landowner-applicant submits a take estimate with an alternate discovery rate, they must provide the reasons why an alternate rate was used to estimate take, including relevant information supporting their reasoning (% of searchable area, search protocols that will be used, any searcher efficiency trials that have been or will be conducted at facilities and/or demonstration of quick, effective recovery of birds). Please include narrative and/or photos and maps to support this.

Table 10: Annual Take Calculation

<table>
<thead>
<tr>
<th></th>
<th>Newell’s Shearwater</th>
<th>Hawaiian Petrel</th>
<th>Band-rumped Storm-Petrel</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Annual average number (SOS data – or – monitoring data) of downed NESH (5 most recent years), HAPE or BRSP (15 most recent years)</td>
<td>0.80</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2. Annual observed lethal take estimate (12% of 1, all downed birds)</td>
<td>0.10</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3. Annual unobserved lethal take estimate (e.g. 100% of 1, all downed birds if 50% searcher efficiency assumed)</td>
<td>1.00</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4. Total estimated annual lethal take from light attraction (2+3)</td>
<td>1.10</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Requested Annual Lethal Take</td>
<td>1.10</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Requested Take Over Permit Term</td>
<td>33.00</td>
<td>0.033 (1 for 30 year permit)</td>
<td>0.033 (1 for 30 year permit)</td>
</tr>
</tbody>
</table>

KSHCP-PIP Kauai Marriott Resort
23
Item 2. Select the requested take authorization and permit/license term coverage for each of the Covered Species.

**Table 11: Newell’s Shearwater:**

<table>
<thead>
<tr>
<th>Age Class</th>
<th>Annual Take Estimate: Fledglings</th>
<th>Annual Take Estimate: Adults or Sub-Adults</th>
<th>Take Limit for License/Permit Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortality (Lethal)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Injury (Non-lethal)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 12: Hawaiian Petrel:**

<table>
<thead>
<tr>
<th>Age Class</th>
<th>Annual Take Estimate: Fledglings</th>
<th>Annual Take Estimate: Adults or Sub-Adults</th>
<th>Take Limit for License/Permit Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortality (Lethal)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Injury (Non-lethal)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 13: Band-Rumped Storm-Petrel:**

<table>
<thead>
<tr>
<th>Age Class</th>
<th>Annual Take Estimate: Fledglings</th>
<th>Annual Take Estimate: Adults or Sub-Adults</th>
<th>Take Limit for License/Permit Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortality (Lethal)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Injury (Non-lethal)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Item 3. Funding Assurance. Provide proof of adequate funding (see KSHCP document). All participants must demonstrate requisite funding prior to permit/license approval to ensure that the proposed measures and actions, including monitoring, will be undertaken in accordance with the terms and schedule of the KSHCP.

The Kaua‘i Marriott Resort currently undertakes all minimization and conducts all monitoring using its existing staff as part of annual operating budget, and will continue to do so through the term of the KSHCP. The Kaua‘i Marriott Resort will provide financial assurances as required by the KSHCP.

Signature of Participant:

________________________________________

Date:___________________

Printed Name :

________________________________________

The undersigned affirms that all the information included is true and accurate to the best of the participant’s knowledge and that this PIP is voluntarily submitted.

☐ check to waive confidentiality
1. Appendices

Appendix A – Tax Map Keys (TMKs) of the Kaua‘i Marriott Resort

Appendix B – Schematic layout of the resort

Appendix C – Kaua‘i Marriott Resort Seabird Awareness and Response Training module

Appendix D – Standard Operating Procedures (Seabird Conservation Awareness Program)

Appendix E – Guest Seabird Conservation Program brochure
APPENDIX A
Purpose of Training

- Native seabird species including endangered species may “fallout” on the Resort property on a seasonal basis
- Kaua‘i Marriott Resort is committed to the protection of these species
- Kaua‘i Marriott Resort has specific endangered bird protocols in place that all construction personnel must follow
- There are potentially significant legal implications if any of these protocols are not followed
Regulatory Setting - Protected Species

Federal -
The Endangered Species Act of 1973, as amended (ESA)
Migratory Bird Treaty Act (MBTA)

State of Hawai‘i -
Hawaii Revised Statutes (Chapter 195-D)

IT IS ILLEGAL TO:
“harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct” any species listed under any of these statutes
Agency and Endangered Species Program Contacts

Who to Call

- **State Department Land & Natural Resources DOFAW**
- Thomas Kaiakapu: Wildlife Manager: (808) 274-3440
  - **Kaua‘I Marriott Resort Program Coordinator**
- Kaupena Kinimaka: (808) 246-5193, mobile: (808) 639-2319
- Seabird Hotline 5796 – any house phone
- Reggie David: Cell: (808) 937-0124, email: davidr003@hawaii.rr.com
Endangered and Threatened Seabird Species

[Images of seabirds: Newell's Shearwater, Hawaiian Petrel, Band-rumped Storm-Petrel]
Seabird Fallout Season Issues

- Night flying seabirds are often attracted to lights
- Fledgling (keiki) birds on their way to sea for the first time are often attracted to lights and can be confused by them
- Confused birds may collide with structures, or simply land on the ground too tired to continue flying
Seabird Issues cont.

- Once on the ground they cannot take off again and will die from starvation or be killed by predators if not rescued
- If the seabirds are recovered and turned into the Save Our Shearwaters Program (SOS), almost 90% of them can be returned to the wild
Downed Seabird Response Protocols

• If a downed seabird is found, immediately call your supervisor and the Global Safety and Security in-house number 5796.

• Stay with the bird until a Safety and Security officer arrives on the scene, follow their instructions.
Take Home Message

- The harming of listed seabirds may be construed as “take” under the ESA, and/or HRS 195D.
- The minimization and avoidance of “take” to the maximum extent practicable is required under both federal and State of Hawaii endangered species statutes.
- Failure to do so may result in enforcement action, which may result in significant civil and criminal penalties.
- Penalties include civil fines of up to $25,000 per incident, and criminal fines of up to $50,000, and up to one year federal imprisonment per incident.
- Non compliance with any of the endangered species rules and protocols will result in immediate disciplinary action.
Mahalo

Kaua‘i Marriott Resort thanks you for your attention to and your assistance with this program

Kaua‘i Marriott Resort takes pride in our continued efforts to protect the natural resources on the Island of Kaua‘i

Protection of these native birds is everyone’s responsibility, and is in the common interest of the Island community and future generations
If You Would Like More Information

• Other questions? Please see me after the presentation
APPENDIX D

KAUAI MARRIOTT RESORT & BEACH CLUB
LOCAL STANDARD OPERATING PROCEDURES

LSOP: Seabird Conservation Awareness Plan LP# 74

PURPOSE: To establish a procedure/awareness training ensuring that the Kauai Marriott Resort and Beach Club associates and staff are a working partner with federal and State of Hawaiʻi wildlife conservation and regulatory agencies to conserve our native Seabirds.

ISSUE DATE: 8/08 REVISED: 07/19

PROCEDURE/SCOPE:

Between the months of September 15th to December 15th the Kauai Marriott and its associates will participate in the search, recovery and collection of downed Seabirds (Newell’s Shearwater, Hawaiian Petrel, Band-rumped Storm Petrel and other non-listed seabird species) on property.

Training and Awareness

Hotel Management will participate in an annual Seabird Awareness and Response training.

Hotel Management will educate our guests by having literature (flyer) in the individual guest rooms and a poster in the lobby area explaining our conservation efforts, the SOS Program, the Kauai Marriott’s role in protecting birds through the SOS program, as well as the part the guests play in protecting Seabirds.

The Hotel will educate its employees by putting information in the daily Discovery Page. All pre-shift meetings will have Seabird Awareness and Response discussions. Management will also have Seabird Awareness and Response discussions in their “Managers Stand-up” meetings on Monday, Tuesday and Wednesday.

Prior to the start of the seabird fallout season, Hotel management will conduct a lighting audit of the Resort with a qualified seabird biologist. The objective of that survey is to identify any lights on Resort grounds that might attract Seabirds to our property. Engineering or the grounds department will make the appropriate adjustments to light fixtures as needed.

KSHCP-PIP Kauai Marriott Resort Appendices 15
DLNR and the SOS Program will place a SOS Aid Station on property on or around September 15th each year in a suitable location (currently the Loading Dock Area).

Global Safety & Security officers will keep a log of birds recovered on the property, with all pertinent data. They will also complete filling the "White Board" at the SOS Aid Station with the following information.

- Date:
- Time:
- Location found:
- Condition of bird: (Good) (Injured) (Dead)
- Type: Newell’s Shearwater; Hawaiian Petrel; Band-rumped Storm Petrel; or other (if known).

**Monitoring**

Safety & Security officers (2) plus one Supervisor (1) and one duty engineer (1) will make it part of their duties during the Seabird season to be vigilant about looking for downed Seabirds during their respective shifts.

Patrol duties include making two rounds of the property in an 8 hours period (shift). During their patrol during the Seabird Season, the officer will make more comprehensive search of the property, and bushy areas such as by Dukes, Gardens, and fronting the Kahili tower.

A daily log will be submitted to the Director of Global Safety & Security of Birds found or not, at the end of the shift.

Patrol officers & Engineer person will follow the "Recover Procedure" below when necessary.

**Recover Procedure:**

Deploy the Seabird Recovery Kit which should contain the following items:

- Latex or nitrite gloves
- Three towels
- Hand Sanitizer
- Flashlight
- Clip Board, pen, “Bird Take Log”
- Bird Carrier (Cardboard Box) with note as a “Live Animal”
Live Bird Handling and Procedures:

1. Take the seabird recovery kit and pet carrier to the downed seabird
2. Put on gloves
3. Using towel to gently cover the bird, pick up the seabird
4. Place the seabird in the pet carrier, and close the pet carrier
5. Put the gloves and towel back in the seabird rescue kit
6. Take the bird and pet carrier to an SOS Aid Station – located on the loading dock
7. Transfer the bird to the Aid Station
8. Call SOS at 635-5117 or 632-0610
9. Return the seabird rescue kit and pet carrier to the dairy, replace towel and clean cage with bleach, if dirty
10. Complete the Downed Wildlife Form
11. Turn in the completed form to the Director of Global Safety & Security
12. Note in the nightly log where the bird was found, or if found off property

Dead Bird Handling and Procedures:

1. Place dead seabirds in a two gallon Zip-Loc plastic bag – double bag the bird
2. Write the Date and Property on the outer bag with a permanent Marker
3. Place in a refrigerator
4. Complete the Downed Wildlife Form
5. Turn in the completed form to the Director of Global Safety & Security
6. Note in the nightly log where the bird was found, or if found off property

Reporting to Agencies:

A call shall be made to the USFWS and DOFAW within 24 hours of a downed bird being recovered on the property.

If a dead bird is recovered follow the instructions received from DOFAW-Kauai Branch, they will most likely pick up the carcass, but in some circumstances instruct the Resort to dispose of the carcass.

A copy of the Downed Wildlife form in .pdf format will be submitted via email to both the USFWS and DFOAW within 72 hours.

This policy is subject to periodic review
Contacts:

USFWS

DLNR-DOFAW

These contacts will be updated once the agencies determine the point people for these agencies.
Kaua’i is still home to many species of seabirds that nest and raise their young in our mountain forests and coastal beaches.

When they leave their nests, seabird fledglings are guided by the light of the moon out to sea. Unfortunately, urbanization on Kaua’i has resulted in the ongoing fallout of the fledgling seabirds on their first nocturnal flight from their nesting burrow to sea.

Protecting the seabird’s nesting habitat and reducing the mortalities due to light attraction are critical to the survival of this species.

**HOW YOU CAN HELP**

- *When not in room, please turn off all lights*
- *When in room in the evening, please close your drapes*

On behalf of the staff and management of the KAUA’I MARRIOTT RESORT & BEACH CLUB,

*Mahalo FOR YOUR SUPPORT.*

KSHCP-PIP Kauai Marriott Resort Appendices
Kauaʻi Seabird Habitat Conservation Program (KSHCP)

Participant Inclusion Plan (PIP) Template

Name of Applicant/Participant: Kauai Coffee Company, LLC

This Participant Inclusion Plan (PIP) template provides a convenient method for non-federal entities to provide the required information to apply for incidental take authorization under the terms of the KSHCP (the Program). Each applicant is required to complete and submit a PIP as part of their application materials in order to apply for an Incidental Take License (ITL) from the State of Hawaiʻi Department of Land and Natural Resources (DLNR) and an Incidental Take Permit (ITL) from the U.S. Fish and Wildlife Service (USFWS) under the KSHCP.

All applicants should consult the KSHCP document for the terms and conditions and the approval process through which the PIP will be evaluated by the DLNR and the USFWS. Staff from the USFWS and the DLNR can provide assistance with completion of this PIP. State of Hawaiʻi DLNR may require fees for this service under the state’s habitat conservation “technical assistance program.”
KSHCP Participant Inclusion Plan (PIP)

Thank you for your interest in the Kaua‘i Seabird HCP.

Instructions: Please complete all items in Part I and II of this form by providing information requested for each item below. Additional pages may be attached to this template as needed to adequately provide the necessary information. Non-federal entities should consult the KSHCP document for items requested in this PIP template and the terms and conditions of the KSHCP (a separate USFWS process is available for federal entities or entities with a federal nexus).

Staff from the DLNR and/or the USFWS may contact the applicant regarding any incomplete information or items needing further clarification. This PIP must be deemed complete before they are able to be processed; incomplete PIP forms will not be processed.

Part 1: Landowner & Property Information; Description of the Facilities; Avoidance & Minimization Measures; Monitoring of Take

Item 1. Provide the name of the landowner, business, agency, or institution and complete contact information. If the applicant/participant is different from the landowner, please attach power of attorney (or other documentation) allowing the party to act on the landowner’s behalf.

Participant/Applicant Name: Kauai Coffee Company, LLC

Physical Address/Location of Facility: 870 Halewili Rd, Kalaheo, HI 96741

Mailing Address: P.O. Box 530, Kalaheo, HI 96741

Primary Contact: Ownership Name: Massimo Zanetti Beverage USA, Inc.

Address: 1370 Progress Road, Suffolk, VA, 23434

Alternate Contact: Name: Fred Cowell

Address: P.O. Box 530, Kalaheo, HI 96741
Item 2. Provide the legal description of the property at which the existing facilities and Covered Activities are located, including Tax Map Key (TMK) number. Provide a survey of the property and site plan drawings showing the locations of the Covered Activities (lights), property boundaries, buildings & structures, and site features. If properties containing the Covered Activities comprise separate parcels please include all Tax Map Key numbers and maps.

- The subject property is comprised of the following TMK #s:

  (4) 2-1-001: 001  (4) 2-1-001: 037  (4) 2-3-010: 010
  (4) 2-1-001: 003  (4) 2-2-001: 001  (4) 2-3-010: 011
  (4) 2-1-001: 027  (4) 2-2-001: 004  (4) 2-3-010: 012
  (4) 2-1-001: 035  (4) 2-2-001: 007  (4) 2-6-003: 001
  (4) 2-1-001: 036  (4) 2-3-010: 001

- A site map is included here with TMK listing, as well as a map highlighting the processing operations area.
Item 3. Describe the existing Covered Activities for which incidental take authorization is sought. Include description of the facility and its function; lights (make, model, and type); buildings and structures; grounds. Photos may be attached. The suggested light table, and green sea turtle (honu) assessment table below may each be modified as needed to provide the necessary information.

- See attached maps. Coffee orchard harvesting take place in the fields, and coffee cherry processing operations take place in the region designated as the Processing Operation area.

- Honu Table Not Applicable.
### Outdoor Lighting at Facility

<table>
<thead>
<tr>
<th>Light Type</th>
<th>Light output (e.g., lumens) &amp; bulb type</th>
<th>Bulb Color</th>
<th>Quantity (No. Fixtures)</th>
<th>Location</th>
<th>Purpose of the Lights</th>
<th>Direction of Light angle (e.g., up, down, out)</th>
<th>Full cut-off/shielded fixture (y / n)</th>
<th>Time on/Time off</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parking lot pole light</td>
<td>150W Mercury vapor</td>
<td>White</td>
<td>4</td>
<td>Wet Plant</td>
<td>Safety &amp; Security</td>
<td>Down &amp; Out</td>
<td>N</td>
<td>Dusk-Dawn</td>
</tr>
<tr>
<td></td>
<td>150W Mercury vapor</td>
<td>White</td>
<td>2</td>
<td>Dryer Bins</td>
<td>Safety &amp; Security</td>
<td>Down &amp; Out</td>
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<td>Dusk-Dawn</td>
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<td></td>
<td>150W Mercury vapor</td>
<td>White</td>
<td>6</td>
<td>Waste Plant</td>
<td>Safety &amp; Security</td>
<td>Down &amp; Out</td>
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<td>Dusk-Dawn</td>
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<tr>
<td></td>
<td>150W Mercury vapor</td>
<td>White</td>
<td>1</td>
<td>Vert Dryer 1</td>
<td>Safety &amp; Security</td>
<td>Down &amp; Out</td>
<td>N</td>
<td>Dusk-Dawn</td>
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<td>Parking lot pole light</td>
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<td>White</td>
<td>2</td>
<td>Berico 14/15</td>
<td>Safety &amp; Security</td>
<td>Down</td>
<td>N</td>
<td>Dusk-Dawn</td>
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<td>Parking lot pole light</td>
<td>150W Mercury vapor</td>
<td>White</td>
<td>2</td>
<td>Field Office</td>
<td>Safety &amp; Security</td>
<td>Down</td>
<td>N</td>
<td>Dusk-Dawn</td>
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<td>Signage illumination:</td>
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<td>Wall-pack building lights:</td>
<td>150W HiPresSodium</td>
<td>White</td>
<td>1</td>
<td>ADS Entry</td>
<td>Safety &amp; Security</td>
<td>Down &amp; Out</td>
<td>N</td>
<td>Dusk-Dawn</td>
</tr>
<tr>
<td></td>
<td>100W Mercury vapor</td>
<td>White</td>
<td>3</td>
<td>Field Office</td>
<td>Safety &amp; Security</td>
<td>Down &amp; Out</td>
<td>N</td>
<td>Dusk-Dawn</td>
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<tr>
<td></td>
<td>100W Metal Halide</td>
<td>White</td>
<td>1</td>
<td>Berico MCC</td>
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<td>Down &amp; Out</td>
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<tr>
<td></td>
<td>100W HiPresSodium</td>
<td>White</td>
<td>5</td>
<td>Visitor Center</td>
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<td></td>
<td>175W HiPresSodium</td>
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<td>4</td>
<td>Admin/Roast</td>
<td>Safety &amp; Security</td>
<td>Down &amp; Out</td>
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<tr>
<td></td>
<td>400W Metal Halide</td>
<td>White</td>
<td>4</td>
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<td>Safety &amp; Security</td>
<td>Down &amp; Out</td>
<td>N</td>
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<tr>
<td></td>
<td>150W HiPresSodium</td>
<td>White</td>
<td>2</td>
<td>Electric Shop</td>
<td>Safety &amp; Security</td>
<td>Down &amp; Out</td>
<td>N</td>
<td>Dusk-Dawn</td>
</tr>
<tr>
<td></td>
<td>400W Metal Halide</td>
<td>White</td>
<td>2</td>
<td>Equip Shop</td>
<td>Safety &amp; Security</td>
<td>Down &amp; Out</td>
<td>N</td>
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<tr>
<td></td>
<td>400W Metal Halide</td>
<td>White</td>
<td>8</td>
<td>Kanani Mill</td>
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<td></td>
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<td>Pali Uli Mill</td>
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<td>Dusk-Dawn</td>
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<tr>
<td>Landscaping/grounds/accen:</td>
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<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
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<td>Roof flood lights:</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>60W Par Halogen</td>
<td>White</td>
<td>13</td>
<td>Field Office</td>
<td>Safety &amp; Security</td>
<td>Down &amp; Out</td>
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<td>Dusk-Dawn</td>
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<tr>
<td></td>
<td>60W Par Halogen</td>
<td>White</td>
<td>11</td>
<td>Visitor Center</td>
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<td>Down &amp; Out</td>
<td>N</td>
<td>Dusk-Dawn</td>
</tr>
<tr>
<td></td>
<td>100W CFL</td>
<td>White</td>
<td>2</td>
<td>Equip Shop</td>
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<td>Y</td>
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<tr>
<td></td>
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<td>Blue</td>
<td>1</td>
<td>Carpenter Shop</td>
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<td>Down &amp; Out</td>
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<tr>
<td></td>
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<td>White</td>
<td>3</td>
<td>Carpenter Shop</td>
<td>Safety &amp; Security</td>
<td>Down &amp; Out</td>
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<td>Dusk-Dawn</td>
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<tr>
<td></td>
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<td>Red</td>
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<td>Carpenter Shop</td>
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<td>Down &amp; Out</td>
<td>N</td>
<td>Dusk-Dawn</td>
</tr>
<tr>
<td></td>
<td>60W Par Halogen</td>
<td>Green</td>
<td>2</td>
<td>Carpenter Shop</td>
<td>Safety &amp; Security</td>
<td>Down &amp; Out</td>
<td>N</td>
<td>Dusk-Dawn</td>
</tr>
</tbody>
</table>

KSHCP Participant Inclusion Plan (PIP) template; Updated July 2019

Page 7
<table>
<thead>
<tr>
<th>Other lights: Warehouse</th>
<th>400W Metal Halide</th>
<th>White</th>
<th>1</th>
<th>Wet Plant</th>
<th>Field Office</th>
<th>Safety &amp; Security</th>
<th>Down</th>
<th>Y</th>
<th>Dusk-Dawn</th>
</tr>
</thead>
<tbody>
<tr>
<td>LED-Motion</td>
<td>20W LED</td>
<td>White</td>
<td>5</td>
<td>Field Office</td>
<td>Visitor Center</td>
<td>Safety &amp; Security</td>
<td>Down &amp; Out</td>
<td>N</td>
<td>Motion Activated</td>
</tr>
<tr>
<td>Wall Lantern</td>
<td>100W CFL</td>
<td>White</td>
<td>6</td>
<td>Visitor Center</td>
<td>Visitor Center</td>
<td>Safety &amp; Security</td>
<td>Down &amp; Out</td>
<td>N</td>
<td>Dusk-Dawn</td>
</tr>
<tr>
<td>LED</td>
<td>20W LED</td>
<td>White</td>
<td>1</td>
<td>Visitor Center</td>
<td>Visitor Center</td>
<td>Safety &amp; Security</td>
<td>Down &amp; Out</td>
<td>N</td>
<td>Dusk-Dawn</td>
</tr>
<tr>
<td>Street Light on Building</td>
<td>150W Mercury vapor</td>
<td>White</td>
<td>1</td>
<td>Visitor Center</td>
<td>Visitor Center</td>
<td>Safety &amp; Security</td>
<td>Down &amp; Out</td>
<td>N</td>
<td>Dusk-Dawn</td>
</tr>
<tr>
<td>Wall Mounted Jelly Jar</td>
<td>100W CFL</td>
<td>White</td>
<td>6</td>
<td>Admin/Roast</td>
<td>Admin/Roast</td>
<td>Safety &amp; Security</td>
<td>Down &amp; Out</td>
<td>N</td>
<td>Dusk-Dawn</td>
</tr>
<tr>
<td>LED Motion</td>
<td>20W LED</td>
<td>White</td>
<td>4</td>
<td>Admin/Roast</td>
<td>Admin/Roast</td>
<td>Safety &amp; Security</td>
<td>Down &amp; Out</td>
<td>N</td>
<td>Dusk-Dawn</td>
</tr>
<tr>
<td>LED</td>
<td>40W LED</td>
<td>White</td>
<td>1</td>
<td>Fuel Station</td>
<td>Fuel Station</td>
<td>Safety &amp; Security</td>
<td>Down &amp; Out</td>
<td>Y</td>
<td>Dusk-Dawn</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other Lights-Harvest Operations:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Korvans (14)</td>
</tr>
<tr>
<td>Korvan (1)</td>
</tr>
<tr>
<td>Komatsu Loader</td>
</tr>
<tr>
<td>Hyundai Loader</td>
</tr>
<tr>
<td>Light Plant</td>
</tr>
<tr>
<td>35W Halogen-200L</td>
</tr>
<tr>
<td>180W LED-10K-L</td>
</tr>
<tr>
<td>18W LED</td>
</tr>
<tr>
<td>180W LED-10K-L</td>
</tr>
<tr>
<td>18W LED</td>
</tr>
<tr>
<td>3,200L Halogen</td>
</tr>
<tr>
<td>1250W Metal Halide</td>
</tr>
<tr>
<td>150K-L</td>
</tr>
<tr>
<td>White</td>
</tr>
<tr>
<td>White</td>
</tr>
<tr>
<td>White</td>
</tr>
<tr>
<td>White</td>
</tr>
<tr>
<td>White</td>
</tr>
<tr>
<td>White</td>
</tr>
</tbody>
</table>

Will Complete Audit Within 60 Days and Submit.
Item 4. If applicable, describe any lighting standards (e.g., foot candles/area) required for facility operations or other requirements that necessitate the use of lighting (e.g., required for security, safety, operations). Describe the relevant standard, or regulation, and the areas and Covered Activities at the site (e.g., type of lighting) to which it applies.

- Minimum lighting required for safe practices during 24-hour operations. For outdoor walking areas and open-air portions of the plant a minimum illumination to comply with OSHA workplace safety guidelines would be 5 candle-feet.

- Twenty-four hour operations only during harvesting season, approximately Sep – Dec for harvesting in the fields and Sep – Apr for processing operations.
Item 5. Describe any plans/proposals for future facilities or expansion of existing facilities. Include any proposed structures and lighting by type, purpose, location, and quantity. Plans (architecture and site plans), photos, and drawings can be attached.

None.
Item 6. Pursuant to the Endangered Species Act (ESA), Section 10 (a)(2)(A)(iii), describe alternatives to avoid the taking considered and evaluated. Provide reasons why those alternatives are not being utilized. Alternatives can include operational or facility design changes (attach pages as needed). The tables below may be altered as needed.

- Outdoor lighting has been modified to face downward. Shielding is installed where applicable.

- Night harvest operations will be delayed until 4 hours after sunset for three days either side of the October and November new moon.
## Light Attraction Alternatives to the Taking

<table>
<thead>
<tr>
<th>Artificial Light Attraction Alternatives to the Taking Considered</th>
<th>Reasons Alternatives are not Being Utilized (provide justification)</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Deactivate all outdoor artificial lights from dusk to dawn during the fledgling fall-out season September 15 to December 15</td>
<td>Harvest operations curtailed from sunset + 4 hours during new moon.</td>
</tr>
<tr>
<td>- Change operations to eliminate the need for outdoor artificial lighting (e.g., from nighttime to daylight hours)</td>
<td>See above</td>
</tr>
<tr>
<td>- Shield all lights from visibility from the beach, or screen all honu nests, from May 15 to December 15 to avoid impacting the green sea turtle (honu)</td>
<td>N/A</td>
</tr>
<tr>
<td>- Other alternatives to the taking considered, if any, If facility is proposed, include alternative designs considered</td>
<td></td>
</tr>
</tbody>
</table>

*If facility is proposed, include alternative designs considered.*
Item 7. Describe all site-specific seabird minimization measures considered for the Covered Activities. This item should follow KSHCP minimization objectives and measures as specified in the KSHCP document. Please consult with staff from the DOFAW and the USFWS as needed. The suggested tables below can be altered as needed.

- Minimization measures modify the Covered Activities to reduce the effects of the activity on the Covered Species. KSHCP Participants will be required to implement minimization measures that apply to the facility to the “maximum extent practicable” per applicable state and federal laws which regulate incidental take license/permit issuance by the DLNR and the USFWS.

- Minimization also entails searching and recovering grounded seabirds to minimize the chance of mortality. In addition, the presence of on-site predators (i.e. feral cats, dogs) should be controlled and removed because these animals can prey on grounded seabirds.

- Provide justification, such as policies, regulations, or other rationale for measures that will not be implemented.
## Seabird Light Attraction Minimization Measures Considered

<table>
<thead>
<tr>
<th>Minimization Measures Considered</th>
<th>Feasible? (Y / N)</th>
<th>If not Feasible, Provide Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Change time of light use (lights off earlier)</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>▪ Deactivate unnecessary lights</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>▪ Replace all outdoor lights with full cut-off fixtures</td>
<td>Yes</td>
<td>Where cost effective or otherwise will install shields</td>
</tr>
<tr>
<td>▪ Shield all outdoor lights with full cut-off shields</td>
<td>Yes</td>
<td>Fabrication and installation of full cut off shields where needed in progress</td>
</tr>
<tr>
<td>▪ Angle all lights downward</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>▪ Lower intensity (lumens) of outdoor lights</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>▪ Change bulb color to non-white spectrum</td>
<td>Yes</td>
<td>Change out program in progress</td>
</tr>
<tr>
<td>▪ Prohibit/control unleashed predatory animals; prohibit outdoor feeding of animals; require sealed rubbish containers</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>▪ Provide Worker Seabird Awareness Training to staff</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>▪ Provide outreach materials to staff &amp; guests</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>▪ Host Save Our Shearwaters (SOS) Aid Station</td>
<td>NO</td>
<td>Not suitable for private property/agricultural operations.</td>
</tr>
</tbody>
</table>
Item 8. **Minimization Plans.** Provide a plan to minimize the effects of the Covered Activities. KSHCP Participants will be required to minimize the effects of the Covered Activities to the “maximum extent practicable” per applicable state and federal laws which regulate take license/permit issuance. The KSHCP document provides minimization objectives and measures to follow.

- The Minimization Plans should include the proposed minimization measures, an estimated completion schedule, and estimated cost for each facility. In this item, the Participant can include measures already completed or in place (new lights, shields, operational changes).

- For minimization measures not yet determined but anticipated to occur at the facility, this section should include an estimated cost that will be earmarked to future minimization measures and a process to determine how and when those measures will be evaluated, selected, and decided (such as a cost-benefit analysis).

- If applicable, the participant must provide the reasoning why certain measures will not be implemented. The suggested table below may each be altered to best describe the Minimization Plan. Attach additional pages, photos, and drawings as needed.
## Seabird Light Attraction Minimization Plan

<table>
<thead>
<tr>
<th>Facility Lights &amp; Operations</th>
<th>Total Qty.</th>
<th>Minimization Measures (suggestions provided)</th>
<th>Cost to Implement</th>
<th>Responsible Staff</th>
<th>Scheduled Date of Completion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parking lot lights</td>
<td>2</td>
<td>Minimization Measures 1. Down-direct all parking lot lights (in place-existing)</td>
<td>$0</td>
<td>General Manager;</td>
<td>8 November 2016</td>
</tr>
<tr>
<td>Signage Lights</td>
<td>0</td>
<td>Not Applicable</td>
<td>NA</td>
<td>General Manager;</td>
<td>NA</td>
</tr>
<tr>
<td>Wall-pack lights</td>
<td>40</td>
<td>Minimization Measures 1. Wall-packs are down-directed full cut-off &amp; shielded fixtures. Shield installation in progress for lights without shields.</td>
<td>$8,000</td>
<td>General Manager;</td>
<td>August 2017</td>
</tr>
<tr>
<td>Landscaping &amp; grounds lighting</td>
<td>0</td>
<td>Not Applicable</td>
<td>NA</td>
<td>General Manager;</td>
<td>NA</td>
</tr>
</tbody>
</table>

**KSHCP Participant Inclusion Plan (PIP) template; Updated July 2019**
<table>
<thead>
<tr>
<th>Minimization Measures</th>
<th>Describe minimization method (e.g. trapping, outreach, enact policy)</th>
<th>Cost to Implement</th>
<th>Responsible Staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remove &amp; control loose predatory animals at the facility. (Loose animals can kill grounded seabirds and this measure aims to prevent seabird mortality by animals.)</td>
<td>Trapping of feral cats. Factory area 2 traps checked daily multiple times throughout the day.</td>
<td>$200.00 per month</td>
<td>General Manager; Department Manager, Safety Manager</td>
</tr>
<tr>
<td>Prohibit outdoor feeding of predatory animals. (feeding animals attracts them to the site and this measure aims to reduce the presence of animals that can cause seabird mortality.)</td>
<td>Yes, integrated into training plan. Signs posted at time clocks, email blasts are sent and reminders weekly at before shift safety meetings by department managers.</td>
<td>N/A</td>
<td>General Manager; Department Manager, Safety Manager</td>
</tr>
<tr>
<td>Conduct nightly/morning searches to recover downed birds at the property &amp; turn them into SOS following protocols (see monitoring plan below).</td>
<td>Awareness through training of all shift personnel. Bird search integrated into shift change operations in harvesting and processing.</td>
<td>N/A</td>
<td>General Manager; Field and Factory Supervisors and Managers, Safety Manager</td>
</tr>
<tr>
<td>Train staff to follow minimization measures.</td>
<td>Yes.</td>
<td>N/A</td>
<td>General Manager; Safety Manager</td>
</tr>
</tbody>
</table>
Item 9. Monitoring Plan. Provide a plan to monitor take of the Covered Species at the facilities proposed to be covered by the incidental take permit/license. The monitoring plan describes how the property will be searched for downed Covered Seabirds. A monitoring plan is also required for the green sea turtle if potential exist for take of that species. The KSHCP document provides standards and guidelines for take monitoring to ensure that take of the species is accurately measured and recorded.

The KSHCP document provides two options for accomplishing monitoring of take at facilities covered under an incidental take permit/license issued to a landowner:

**Option 1**: “Self-monitoring.” Participants arrange for monitoring of take at their facilities and fund the DLNR to conduct calibration of the monitoring. Self-monitoring can be accomplished with “in-house” staff trained as searchers, or other means such as contracting for the service; or

**Option 2**: Participants fund the DLNR to conduct compliance monitoring of take at their facilities (requires consultation with DLNR-DOFAW).

The KSHCP document provides details including terms and conditions that apply to these two options. For large-scale facilities, Participants should consult with the USFWS and the DLNR for monitoring methods that are scale-appropriate to the size and scale of the facility.

The regulatory agencies will make the final determination as to the adequacy of the take monitoring plan.

<table>
<thead>
<tr>
<th>KSHCP Options for Monitoring of Take</th>
<th>Check box (leave unchecked if not sure)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Select one</strong></td>
<td></td>
</tr>
<tr>
<td>Option 1. “Self-monitoring” of take</td>
<td>X</td>
</tr>
<tr>
<td>Option 2. The DLNR conducts monitoring of take (requires Participant funding &amp; DLNR consultation)</td>
<td>☐</td>
</tr>
</tbody>
</table>
Components of the Covered Seabird Monitoring Plan. Please provide the following information.

The table below may be used and altered as needed.

1) Detailed maps of the property indicating structures and property features; topography; any unsearchable areas; and the proposed seabird monitoring, or search, route (attach map with search route).

2) Monitoring Protocols indicating:
   a) Annual training of searchers;
   b) Frequency of searches (twice daily or as much as possible);
   c) Time of day (recommended to search 1-3 hours after sunset and 1-3 hours before sunrise, or provide other time and provide reason);
   d) Search methods (e.g. looking under & around objects);
   e) Record keeping method (downed wildlife data sheet, photographs);
   f) Sufficient number of trained searchers to cover the area.

3) All Participants conducting self-monitoring are required to record the results of search efforts on a “downed wildlife”, or similar form, and provide photographs of seabirds found. When downed wildlife have been found, Participants should notify the USFWS and the DLNR within three days.
### Covered Seabird Take Monitoring Protocols

Please provide the following information for the protocol items below

<table>
<thead>
<tr>
<th>Item</th>
<th>Protocol (fill in protocol &amp; provide reasons)</th>
<th>KSHCP Guideline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage of the total property that will be searched &amp; the total area to be searched</td>
<td>Search, recovery, reporting at all shift changes for all lighted areas.</td>
<td>Search as much area as possible</td>
</tr>
<tr>
<td>Frequency of searches (# per day or per week)</td>
<td>Twice per day.</td>
<td>Twice daily</td>
</tr>
<tr>
<td>Time of day of searches</td>
<td>5:30 PM and 5:30 AM</td>
<td>1 hour before and after sunrise; 1-2 hours after sunset</td>
</tr>
<tr>
<td>Number of searchers per search area</td>
<td>Harvesting = 10, Processing = 20</td>
<td>Depends on site conditions and safety considerations</td>
</tr>
<tr>
<td>Proposed training</td>
<td>Annual training per guidelines (already being done).</td>
<td>Annual training covering seabird identification, seabird handling, response procedures, verified and documented</td>
</tr>
</tbody>
</table>
Item 9a. Training. If this PIP includes “self-monitoring” as the option to monitor take, training must be provided to those that will conduct and oversee the searches at the facility.

The “self-monitoring” training should include:

1. Summary of regulations protecting the Covered Species; As provided by KSHCP
2. Search procedures, route, frequency and timing specific to the facility’s monitoring plan, for seabirds and green sea turtle nests; Harvesting supervisors will be responsible for field/farm self-monitoring. Harvesting night shift supervisor will be actively searching in the vicinity of harvesting operations. Please see attached farm map for example. For instance, if harvesting is taking place in field 218 searches will commence throughout the field and on routes to and from the factory/shop areas. Searches will be done daily on scheduled work days, throughout the night shift (6p-4:30a) and beginning of the day shift (6a-9a).
3. Response procedures including safe and proper techniques for handling seabirds; See attached document
4. Recognizing evidence of green sea turtle nests (if lights shine on a beach), proper nest light screening, and hatchling activity (e.g., emergence); N/A
5. Procedures to document the results of searches; See attached document
6. Downed wildlife agency contacts; and
7. Nearest SOS aid station. Provided/Trained and placed in every recovery kit

Rescuing Downed Seabirds—Standard Operating Procedures (SOP)

The following steps provide the procedure for recovering downed seabirds found:

1. Take the seabird recovery kit and pet carrier to the downed seabird.
2. Put on gloves.
3. Using towel to gently cover the bird, pick up the seabird.
4. Place the seabird in the pet carrier, and close the pet carrier.
5. Put the gloves and towel back in the seabird rescue kit.
6. Take the bird and pet carrier to an SOS Aid Station. Hanapepe or Kalaheo Fire Station
7. Transfer the bird to the Aid Station’s pet carrier.
8. Call SOS at 632-0610 or 635-5117.
9. Return the seabird rescue kit and pet carrier.
11. Give the completed “Bird Take Field Report” to the General Manager, or other responsible staff person at the facility.

Contents of Seabird Recovery Kit
1. Latex or nitrile gloves;
2. Three towels;
3. Hand sanitizer;
4. Flashlight or headlamp;
5. Clipboard, pen and blank “Bird Take Field Reports”, or similar; and
6. Pet carrier – medium sized. If a box is used it must be well ventilated and marked conspicuously “LIVE ANIMAL”.

Please see attached photos of recovery kit contents. Kauai Coffee has 3 recovery kits. One for factory, one for field, and one spare for any other department use and/or for finding more than one bird.
PART 2. Take Estimate, Requested Amount of Take Authorization, and Funding

Item 1. Show the calculation of estimated take for each of the Covered Species.

Following the take estimation methods in the KSHCP for estimating a Participant’s take, the tables and charts below (provided by the KSHCP/DOFAW staff) show the take estimate calculation for the facility for each of the Covered Seabirds.

The KSHCP take estimate method utilizes the average of the most recent 5 years of SOS recovery data for the facility, and/or results of KSHCP monitoring data if available. Applied to the data is an adjustment for downed birds not found, assumed at 50 percent until take monitoring provides a more accurate measurement.

If the landowner-applicant submits a take estimate with an alternate discovery rate, provide the necessary supporting information following KSHCP standards.

For facilities with no SOS recovery data, Participants can use recovery records for similarly situated nearby facilities as a proxy and adjust for site-specific circumstances (e.g., facility location, radar flyover data, facility light intensity, and implemented minimization measures).
‘a’o - Newell’s shearwater (*Puffinus newelli*)

### Annual Take Estimate Calculation

<table>
<thead>
<tr>
<th>Participant/Facility Name:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Avg. ‘a’o from SOS data—or—monitoring data if available (5 most recent yrs.)</td>
<td>1</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>0</td>
</tr>
<tr>
<td>Adjustment for unobserved (50% typ.)</td>
<td>0.5</td>
</tr>
<tr>
<td>Total direct take from light attraction</td>
<td>1.5</td>
</tr>
</tbody>
</table>

**Annual Take Estimate ‘a’o**

1.5
Item 2. Select the requested take authorization and permit/license term coverage for each of the Covered Species.

‘a‘o - Newell’s shearwater (Puffinus newelli):

<table>
<thead>
<tr>
<th>Age Class</th>
<th>Annual Take Estimate</th>
<th>5-year Take</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1-5</td>
</tr>
<tr>
<td>Fledgling</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Adult</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Lethal</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Non-lethal</td>
<td>0.5</td>
<td>2.5</td>
</tr>
</tbody>
</table>
It

3. Funding Assurance. Provide proof of adequate funding (see KSHCP document). All participants must demonstrate requisite funding prior to permit/license approval to ensure that the proposed measures and actions, including monitoring, will be undertaken in accordance with the terms and schedule of the KSHCP1.

Signature of Participant: ______________________________________
Printed Name: ____________________________________________ Date: __________________

The undersigned affirms that all the information included is true and accurate to the best of the participant’s knowledge and that this PIP is voluntarily submitted.

☐ check to waive confidentiality

Contact Us
Call the KSHSCP Office at (808) 245-9160 or visit our office at 4272-B Rice Street, Līhu’e HI, 96766. Visit the project website: www.Kauai-seabirdhcp.info. We look forward to working with you toward helping Hawai’i’s unique species!

1 The applicant shall post a bond, provide an irrevocable letter of credit, insurance, or surety bond, or provide other similar financial tools, including depositing a sum of money in the endangered species trust fund created by section 195D-31, or provide other means approved by the board, adequate to ensure monitoring of the species by the State and to ensure that the applicant takes all actions necessary to minimize and mitigate the impacts of the take.
## PIP Completion Checklist Form

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Completion Check</th>
<th>Complete?</th>
<th>Information Needed to Make Item Complete or Outstanding</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Part I: Landowner &amp; Property Information; Description of the Facilities; Avoidance &amp; Minimization Measures; Monitoring of Take</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 1 | Landowner applicant information | • Landowner name/organization  
• Contact information | YES | |
| 2 | Property & Facility description | • TMK or Legal description  
• Maps, site plans.  
• Narrative Description | YES | |
| 3 | Covered Activities | • light table/inventory  
• Description of Utility structures & support structures  
• Maps, site plans, photos.  
• Heights and configurations | NO | 60 Days |
| 4 | Standards for Covered Activities | • Regulations provided  
• Operational needs | N/A | |
| 5 | Future facility plans | • proposed plans provided  
• Site plans, arch drawings,  
• other information | N/A | |
| 6 | Alternatives to the Taking | • Alternatives addressed  
• Reasons provided | YES | |
<table>
<thead>
<tr>
<th></th>
<th>Minimization measures considered</th>
<th>Minimization measures table (or other info.) completed</th>
<th>Reasons provided</th>
<th>Each Covered Activity</th>
<th>Covered Seabirds</th>
<th>YES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Minimization plan</td>
<td>Minimization measures provided</td>
<td></td>
<td></td>
<td></td>
<td>YES</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Timeline and funding</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Plan and process for future minimization measures (e.g., cost-benefit, earmarked funding)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Each Covered Activity (lights &amp; utility)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Covered Seabirds</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Monitor Plan</td>
<td>Selected self-monitoring or DLNR</td>
<td></td>
<td></td>
<td></td>
<td>YES</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Completed plan with protocols</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>Adequate protocols</td>
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<td></td>
<td></td>
<td>Each Covered Activity</td>
<td></td>
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<td></td>
<td></td>
<td>Covered Seabird</td>
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<td></td>
<td></td>
<td>Training for searchers</td>
<td></td>
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<tr>
<td>8</td>
<td>Part II: Take Estimate, Requested Amount of Take Authorization, and Funding</td>
<td>5-year SOS average</td>
<td></td>
<td></td>
<td></td>
<td>YES</td>
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<tr>
<td></td>
<td>Take Estimate Calculation</td>
<td>Discovery rate</td>
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<td></td>
<td>Covered Seabird</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>2</td>
<td>Requested take authorization &amp; permit term</td>
<td>Each Covered Species</td>
<td></td>
<td></td>
<td></td>
<td>YES</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reason provided for discrepancy between estimate and requested amount</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>3</td>
<td>Proof of Adequate Funding</td>
<td>Financial mechanism</td>
<td></td>
<td></td>
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<td>NO</td>
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<tr>
<td></td>
<td></td>
<td>Demonstrated ability to fund</td>
<td></td>
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<tr>
<td></td>
<td>Signature</td>
<td>Signed by landowner, facility owner, or authorized responsible party</td>
<td></td>
<td></td>
<td></td>
<td>YES</td>
</tr>
<tr>
<td></td>
<td></td>
<td>To be completed within 60 days</td>
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</tbody>
</table>
Kauai Seabird Habitat Conservation Program (KSHCP) Outdoor Lighting at Facility

Parking Lot Pole Lights - Top Row L-R: Equipment Shop Banyan Tree - deactivated; Berico #13; Fuel Station (Back parking lot light deactivated –see closeup, and foreground LED light installed & activated)

Wall-Pack Building Lights – Bottom Row L-R: Kanani Mill East Wall@Propane Station; Kanani Mill Loading Dock; Kanani Mill West Wall@Entry; Kanani Mill South Wall
KSHCP Outdoor Lighting

Visitor Center
KSHCP Outdoor Lighting

Field Office Site
KSHCP Outdoor Lighting - KCOF

Administration, Ecomm, Roast Plant Building
KSHCP Outdoor Lighting

Carpenter Shop & Electric Shop
KSHCP Outdoor Lighting

Processing – Wet Plant, Pre-Dryers & Dryers
KSHCP Outdoor Lighting

Processing – Dryers & Milling
KSHCP Outdoor Lighting

Factory Office, Lab and Safety
KSHCP Outdoor Lighting

Equipment Shop, Tire Shop
Kauai Coffee Company, LLC Building Exterior Lighting & Harvest Equipment Inventory 2016:

Visitor Center

Rest Room: West Wall-2 x wall lanterns + West Makai corner- 2 x flood lights
Retail Store: Makai/West corner – 2x flood light
Retail Store Main Entrance: West – 1 x wall pack + 1 x wall lantern
Retail Store Mauka West corner – 2 x flood light
Lanai Mauka – 1 x flood light
Office Mauka – 2 x wall lantern
Museum Mauka window – 1 x wall pack
Roasting Room  Mauka – 2 x flood lights
Store room mauka – 1 x wall pack
Store room east – 1 x LED
VC Mini Plant Makai – 1 x wall pack + 2 x flood lights
VC Mini Plant Mauka – 1 x wall pack
VC Mini Plant east – 1 x street light

Field Office

Pesticide Makai – 2 x flood lights
Pesticide west – 1 x flood light + 1 x LED
Joey Office Mauka – 2 x flood lights x 2 + 2 x LED
Joey Office East – 1 x wall pack
Irrigation Mauka west corner – 2 x flood lights + 1 x wall pack
Irrigation East – 1 x wall pack + 2 x flood lights

**Field Office**

Irrigation Makai – 2 x flood lights

Pesticide Storage – 2 x LED

Parking Lot – 1 x double street light on pole

**Carpenter Shop**

Makai – 1 x flood light

West – 2 x flood lights

Mauka – 2 x flood lights

East - 2 x flood lights

**Administration Building/Roast Plant/E Commerce**

Admin West – 1 x Jelly Jar

Roast Plant Mauka Ext. Alley – 1 x Jelly jar

Roast Plant West – 1 x wall pack + 2 x Jelly Jar@ entrance

Roast Plant East – 1 x wall pack

Admin East – 1 x jelly jar (damaged)

Ecomm East – 1 x jelly jar

Ecomm Makai – 1 x wall pack + 2x LED motion

Admin Makai/Main – 1 x wall pack + 2 x LED motion

**Factory Shops**

Electric Shop East – 2 x wall packs

Tire Shop – 1 x shade light mauka
Fuel Station – 1 x LED + 1 x pole mounted halogen deactivated and removed

**Factory Shops**

Equipment Shop Makai – 2 x wall packs + 1 x shade light

Equipment shop parking at monkey pod – 1 x sl deactivated

Wet Plant Receiving – 3 x street light (on building) + 1 on storage tank

**Processing Plant**

Kanani Mill Makai = 4 x wall packs

Kanani Mill East – 1 x wall pack

Kanani Mill West – 1 x wp

Kanani Mill Loading dock – 2 x wall packs

Pali Uli Mill Makai – 4 x wall packs

Pali Uli Mill Mauka – 4 x wall packs (disconnected)

Pali Uli Mill West – 1 x wall pack

Pulp Waste Plant – 6 x street lights (on building)

Pre dryers East under roof – 2 x sl

Pre Dryers Mauka – 2 x sl

Pre Dryers West – 1 x sl under roof + 1 x sl on post

Vertical Dryers – 1 x sl + 5 x 2x4’ Fluos under conduits

ADS Entry – 1 wp + 1 2x4’ fluo under roof

Bericoo Dryers MCC – 1 x wall pack

Bericoo 14 & 15 parking – 1 x double street light on pole

Bericoo 11-12 storage bins 4 x 2x4’ fluos
**Factory Office Building**

Manager Office West – 1 x wall pack

Lab Mauka – 1 x wall pack

Safety Office East – 1 x wall pack

Lab Lanai – 1 x wall pack

**Security**

Security Shack – 1x wall pack

**Harvest Operations**

Korvans (14) – 6 x halogen 35W 200 lumens

Korvan (1) – 1 x 180W LED, 10,000 lumens + 4 x 18W LED

Komatsu Front End Loader (1) – 1 x 180W LED, 10,000 lumens + 4 x 18W LED

Hyundai Loader (1) – 4 x 3,200 lumens halogen

Light Plant (1) – 4 x 1250W Metal Halide, 150,000 lumens
Rescuing Downed Seabirds—Standard Operating Procedures (SOP)

The following steps provide the procedure for recovering downed seabirds found:

1. Take the seabird recovery kit and pet carrier to the downed seabird.
2. Put on gloves.
3. Using towel to gently cover the bird, pick up the seabird.
4. Place the seabird in the pet carrier, and close the pet carrier.
5. Put the gloves and towel back in the seabird rescue kit.
6. Take the bird and pet carrier to an SOS Aid Station.
7. Transfer the bird to the Aid Station’s pet carrier.
8. Call SOS at 632-0610 or 635-5117.
9. Return the seabird rescue kit and pet carrier.
11. Give the completed “Bird Take Field Report” to the General Manager, or other responsible staff person at the facility.
Seabird Recovery Form

1. DATE FOUND (mm-dd-yyyy)

2. TIME FOUND (am/pm)

3. NUMBER OF SPECIES FOUND AND DESCRIPTION:

<table>
<thead>
<tr>
<th></th>
<th>NEWELL’S SHEARWATER</th>
<th>WEDGE-TAILED SHEARWATER</th>
<th>BAND-RUMPED STORM PETREL</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
<tr>
<td>Other:</td>
<td></td>
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</tr>
</tbody>
</table>

4. LOCATION, FACILITY AREA:

5. COMMENTS

<table>
<thead>
<tr>
<th>Found Dead</th>
<th>Found Alive</th>
<th>Found Injured, Description</th>
</tr>
</thead>
<tbody>
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</tr>
</tbody>
</table>

REPORTER NAME:

AGENCY, BUSINESS, RESORT:

REPORTER TELEPHONE NUMBER:

Thank you for filling out this form. Your report will help in the preservation efforts of our natural wildlife.

Save Our Shearwaters 632-0610 ext. 109 or 635-5117
DLNR KSHCP OFFICE  ph: 245-9160, Fax: 245-9196, cell: 346-3489
# Seabird Daily Search Log

<table>
<thead>
<tr>
<th>Date</th>
<th>Field/Factory Supervisor</th>
<th>Shift/Time</th>
<th>Farm Searched Yes or NWO</th>
<th>No. Birds found. Dead/Injured</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</table>
Kauaʻi Seabird Habitat Conservation Program (KSHCP)

Participant Inclusion Plan (PIP)

Sheraton Kauai Resort
(Starwood Resorts)
PART 1: Landowner & Property Information; Description of the Facilities; Avoidance & Minimization Measures; Monitoring of Take

Item 1. Provide the name of the landowner, business, agency, or institution and complete contact information. If the applicant/participant is different from the landowner, please attach power of attorney (or other documentation) allowing the party to act on the landowner’s behalf.

Applicant: Sheraton Kauai Resort (Starwood Resorts)

Physical Address: 2440 Hoonani Road, Koloa, Hi 96756

Mailing Address: 2440 Hoonani Road, Koloa, Hi 96756

Contact: Security Manager
Address: Joseph Kaneakua
2440 Hoonani Road, Koloa, Hi 96756

Alt. Contact: Position: Dan Sheldon
Address: 2440 Hoonani Road, Koloa, Hi 96756

Item 2. Provide the legal description of the property at which the existing facilities and Covered Activities are located, including Tax Map Key (TMK) number. Provide a survey of the property and site plan drawings showing the locations of the Covered Activities (lights), property boundaries, buildings & structures, and site features. If properties containing the Covered Activities comprise separate parcels please include all Tax Map Key numbers and maps.

The Sheraton Kauai Resort is located at a physical street address of 2440 Hoonani Road, Koloa, Hi 96756.

The resort encompasses three tax map keys:
Oceanside property 2-8-016: 003 = 8.4 acres/365,904 sf
Garden side property 2-8-016: 004, 2-8-015: 43 and 44 = 11.7 acres/509,652 sf

Copies of these TMKs maps are included in Appendix A, and a site plan is included in Appendix B. Lighting location is indicated in Table 1 below.
Item 3. Describe the existing Covered Activities for which incidental take authorization is sought. Include list of buildings, type and description of lights present, purpose and location of lights and current seabird lighting accommodation in place (e.g. shielding, downward pointing, switched off during fledging season etc). For “Types of lights” please use the following categories:

- Parking Lights
- Signage Illumination
- Wall-pack Building Lights
- Landscaping/Grounds/Accent/Bollards
- Indoor lights visible from outdoors
- Roof Floodlights
- Other Lights

Facility lighting plan may be submitted as lighting inventory. Photos may be attached. The suggested light table, and Green Sea Turtle assessment table below may each be modified as needed to provide the necessary information.

The Sheraton Kauai Resort is seeking coverage for operation of artificial lighting in connection with all activities associated with running the Resort. These activities include, lighting for the parking lot & delivery areas, grounds, buildings, and walkways. The property is landscaped throughout the property typical of a resort. The property covers 20.1 acres.

The table below provides the outdoor lighting at the Sheraton Kauai Resort. Table 1 below provides the outdoor lighting at the Resort. The Avoidance and Minimization Plan (item 7) addresses light attraction
<table>
<thead>
<tr>
<th>Light Type Make &amp; Model</th>
<th>Light output (e.g. lumens) &amp; bulb type</th>
<th>Bulb Color</th>
<th>Quantity (No. Fixtures)</th>
<th>Location</th>
<th>Purpose of the Lights</th>
<th>Direction of Light angle (e.g. up, down, out)</th>
<th>Full cut-off/shielded fixture (y / n)</th>
<th>Time on/Time off</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parking lot pole light</td>
<td>bulb type &amp; wattage</td>
<td>Color</td>
<td>39</td>
<td>Parking lot; front, rear &amp; sides</td>
<td>Parking lot illumination – Safety &amp; Security</td>
<td>Down</td>
<td>Yes</td>
<td>12 hr period</td>
</tr>
<tr>
<td></td>
<td>LED / 20 watts</td>
<td>Warm White</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Dusk - Dawn</td>
</tr>
<tr>
<td>Signage illumination flood lights/fluorescent tubes/lit internally</td>
<td>bulb type &amp; wattage</td>
<td>Color</td>
<td>6</td>
<td></td>
<td>Signage – directional purposes</td>
<td>Pointing to signs</td>
<td>Yes</td>
<td>12 hr period</td>
</tr>
<tr>
<td></td>
<td>Ground lights/ 65 watts</td>
<td>white</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Dusk - Dawn</td>
</tr>
<tr>
<td>Wall-pack building lights</td>
<td>bulb type &amp; wattage</td>
<td>Color</td>
<td>332</td>
<td>Wall mounted</td>
<td>Building lights – Safety &amp; Security</td>
<td>Up to ceiling &amp; down to floor</td>
<td>Yes</td>
<td>12 hr period</td>
</tr>
<tr>
<td></td>
<td>20 watts</td>
<td>White</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Dusk - Dawn</td>
</tr>
<tr>
<td>Landscaping &amp; grounds accent floodlights</td>
<td>bulb type &amp; wattage</td>
<td>Color</td>
<td>18</td>
<td>Entry; Courtyard; Pool; Beach Access; Flag Poles; other locations</td>
<td>Landscape illumination; accent lighting</td>
<td>Down</td>
<td>No, but pointed down</td>
<td>12 hr period</td>
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<td></td>
<td>Par 38 type / 65 watts</td>
<td>Warm</td>
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<td>Dusk - Dawn</td>
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<td>White</td>
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<tr>
<td>Short walkway Bollards</td>
<td>bulb type &amp; wattage</td>
<td>Color</td>
<td>40</td>
<td>Walkways</td>
<td>Pedestrian guidance – Safety &amp; Security</td>
<td>Diagonal</td>
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<td>Dusk - Dawn</td>
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</tbody>
</table>

Table 1: Outdoor Lighting at Sheraton Kauai Resort
Table 2 - Green Sea Turtle Assessment for the Site & Facility

Please provide the information requested below to help determine if measures to avoid impacts to the Green Sea Turtle(s) from the effects of light attraction are required to be implemented at any of the facility(s), parcel(s), or site(s) included in this PIP. Please consult with staff from the DLNR and the USFWS to arrange a site visit, if needed, discuss measures to avoid impacts to the Green Sea Turtle, and provide further guidance.

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<th>Question</th>
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| Are any of the facilities located adjacent to a beach?                    | Yes / No | If yes, provide length of beach frontage & brief description of facilities & lights adjacent to the beach.  
2008.2 linear feet fronting the luau garden  
Guest Units and Common Areas w/shielded lighting |
| Are any of the Covered Activities (lights) visible from a beach?          | Yes / No | If yes, describe the specific lights (type, quantity, height, purpose) & specific location; provide map & photos showing distance from beach.  
Ocean Fitness center building 1, 36’ from shoreline. Lavas Bar, 43’ from shoreline. Rum Fire, 33’ from shoreline. Luan Kai, 30’ from shoreline. |
| Have green sea turtles been known to nest on any beaches adjacent to the facilities? | Yes / No | If yes, provide information about nesting occurrences, if known, including location and date and any other information.  
N/A |
Item 4. If applicable, describe any lighting standards (e.g., foot candles/area) required for facility operations or other requirements that necessitate the use of lighting (e.g., required for security, safety, operations). Describe the relevant standard, or regulation, and the areas and Covered Activities at the site (e.g., type of lighting) to which it applies.

There are no specific lighting standards, rules, restrictions or requirements that the Resort must comply with, beyond assuring that lighting is adequate to ensure guest and employee safety and security, in accordance with brand/company safety standards. Pre-seabird season lighting audits will be conducted by a seabird biologist and necessary tweaks to the lighting are completed prior to the start of the seabird season each year.

Item 5. Describe any plans/proposals for future facilities or expansion of existing facilities. Include any proposed structures and lighting by type, purpose, location, and quantity. Plans (architecture and site plans), photos, and drawings can be attached.

The Sheraton Kauai Resort has no plans for the future on the books that would cause us to install extra interior or exterior lights.

Item 6. Pursuant to the Endangered Species Act (ESA), Section 10 (a)(2)(A)(iii), describe alternatives to avoid the taking considered and evaluated. Provide reasons why those alternatives are not being utilized. Alternatives can include operational or facility design changes (attach pages as needed). The tables below may be altered as needed.

Activities that the Sheraton Kauai Resort has direct control over that may result in covered species landing on the property are restricted to those associated with lighting. Other programs that the Resort implements that result in benefits to seabirds include increased staff training, guest outreach (brochures go into guest rooms during the seabird fledging season), and monitoring and rapid recovery of downed seabirds (Appendices C and D). The Resort has addressed all of these issues to the maximum extent practicable. Measures and protocols implemented are detailed in the following sections of the application.

In the following table light attraction avoidance and minimization alternatives that were analyzed are presented.
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<td>Are any of the Covered Activities (lights) visible from a beach?</td>
<td>Yes / No</td>
<td>If yes, describe the specific lights (type, quantity, height, purpose) &amp; specific location; provide map &amp; photos showing distance from beach</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ocean Fitness center building 1, 36’ from shoreline.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lavas Bar, 43’ from shoreline.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rum Fire, 33’ from shoreline.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Luan Kai, 30’ from shoreline.</td>
</tr>
<tr>
<td>Have green sea turtles been known to nest on any beaches adjacent to the facilities?</td>
<td>Yes / No</td>
<td>If yes, provide information about nesting occurrences, if known, including location and date and any other information</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N/A</td>
</tr>
</tbody>
</table>
Table 3 - Light Attraction Alternatives to the Taking

<table>
<thead>
<tr>
<th>Artificial Light Attraction Alternatives to the Taking Considered</th>
<th>Reasons Alternatives are not Being Utilized (provide justification)</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Deactivate all outdoor artificial lights from dusk to dawn during the fledgling fall-out season September 15 to December 15</td>
<td>Lighting is required for direction, safety, and security of the hotel grounds for guests, visitors, and employees.</td>
</tr>
<tr>
<td>▪ Change operations to eliminate the need for outdoor artificial lighting (e.g., from nighttime to daylight hours)</td>
<td>Guest and staff safety and security, precludes this option. To do this the hotel would need to be closed at night, which is not a viable business option.</td>
</tr>
<tr>
<td>▪ Shield all lights from visibility from the beach, or screen all Green Sea Turtle nests, from May 15 to December 15 to avoid impacting the green sea turtle (Green Sea Turtle)</td>
<td>Lights are shielded and the beach is dark. Some beach lighting is required for is required for direction, safety, and security of the beach for guests, visitors, and employees.</td>
</tr>
<tr>
<td>▪ Other alternatives to the taking considered, if any. If facility is proposed, include alternative designs considered</td>
<td>The resort has replaced a very large number of lights on and in the resort to reduce the amount of stray light being produced. Window blinds have been placed in all hallways and rooms in the resort reducing the visible interior lighting. Bulbs have been reduced in lumens over the past 10 years. All upward pointing lights have been removed or are turned off during seabird fledging season. See Seabird Lighting Minimization Procedures on Page 1-9.</td>
</tr>
</tbody>
</table>
Item 7. Describe all site-specific seabird minimization measures considered for the Covered Activities. This item should follow KSHCP minimization objectives and measures as specified in the KSHCP document. Please consult with staff from the DOFAW and the USFWS as needed. The suggested tables below can be altered as needed.

Minimization measures modify the Covered Activities to reduce the effects of the activity on the Covered Species. KSHCP Participants will be required to implement minimization measures that apply to the facility to the “maximum extent practicable” per applicable state and federal laws which regulate incidental take license/permit issuance by the DLNR and the USFWS.

Minimization also entails searching and recovering grounded seabirds to minimize the chance of mortality. In addition, the presence of on-site predators (i.e. feral cats, dogs) should be controlled and removed because these animals can prey on grounded seabirds.

Provide justification, such as policies, regulations, or other rationale for measures that will not be implemented.
<table>
<thead>
<tr>
<th>Minimization Measures Considered</th>
<th>Feasible? (Y / N)</th>
<th>If not Feasible to Implement Measures, Provide Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Change time of light use (lights off earlier)</td>
<td>YES / No</td>
<td>Facility operates at all hours and grounds safety is required.</td>
</tr>
<tr>
<td>▪ Deactivate unnecessary lights</td>
<td>YES / No</td>
<td></td>
</tr>
<tr>
<td>▪ Replace all outdoor lights with full cut-off fixtures</td>
<td>YES / No</td>
<td>Except lights that are very low to ground and shielded by vegetation.</td>
</tr>
<tr>
<td>▪ Shield all outdoor lights with full cut-off shields</td>
<td>YES / No</td>
<td>Except lights that are very low to ground and shielded by vegetation.</td>
</tr>
<tr>
<td>▪ Angle all lights downward</td>
<td>YES / No</td>
<td>Except lights that are very low to ground and shielded by vegetation.</td>
</tr>
<tr>
<td>▪ Lower intensity (lumens) of outdoor lights</td>
<td>YES / No</td>
<td></td>
</tr>
<tr>
<td>▪ Change bulb color to non-white spectrum</td>
<td>YES / No</td>
<td>Warm tone lights are in use</td>
</tr>
<tr>
<td>▪ Prohibit/control unleashed predatory animals; prohibit outdoor feeding of animals; require sealed rubbish containers</td>
<td>YES / No</td>
<td>There are no unleashed animals on property, and trash bins have restricted coverings.</td>
</tr>
<tr>
<td>▪ Provide Worker Seabird Awareness Training to staff</td>
<td>YES / No</td>
<td>See Item 6, above, and Appendix C (Standard Operating Procedure).</td>
</tr>
<tr>
<td>▪ Provide outreach materials to staff &amp; guests</td>
<td>YES / No</td>
<td>See item 6, above, and Appendix D (guest brochure).</td>
</tr>
<tr>
<td>▪ Host Save Our Shearwaters (SOS) Aid Station</td>
<td>YES / No</td>
<td>The Resort has hosted a SOS Aid Station for many years.</td>
</tr>
</tbody>
</table>
Item 8. **Minimization Plans.** Provide a plan to minimize the effects to the Covered Seabirds due to the Covered Activities. KSHCP Participants will be required to minimize the effects of the Covered Activities to the “maximum extent practicable” per applicable state and federal laws which regulate take license/permit issuance. The KSHCP document provides minimization objectives and measures to follow.

The Minimization Plans should include the proposed minimization measures, an estimated completion schedule, and estimated cost for each facility. In this item, the Participant can include measures already completed or in place (new lights, shields, operational changes).

Minimization measures not yet determined but anticipated to occur at the facility; this section should include an estimated cost that will be earmarked for future minimization measures and a process to determine how and when those measures will be evaluated, selected, and decided (such as a cost-benefit analysis).

If applicable, the participant must provide the reasoning why certain measures will not be implemented. The suggested table below may each be altered to best describe the Minimization Plan. Attach additional pages, photos, and drawings as needed.

The foregoing avoidance and minimization measures were implemented, and costs associated with implementing these measures have already been incurred.

A biologist will accompany the Security Manager and the engineering department to conduct a lighting audit of the entire property prior to the onset of the seabird fallout season annually. The biologist will follow up with the Resort to ensure that any lighting minimization modifications that the biologist identified have been implemented. The biologist will also check the hotel several times during the season without notifying the Resort to ensure that all measures are in place. The biologist monitors will monitor the fallout season in real time and returns to the Resort if anything shows up in the fallout data that suggests that there may be a problem with the lighting minimization measures.
**Table 5: Lighting Minimization Measures**

<table>
<thead>
<tr>
<th>List of Buildings</th>
<th>Minimization Measures</th>
<th>Cost to Implement</th>
<th>Responsible Staff</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parking lot lights (39)</td>
<td>Lights are full cut-off fixtures; lights are down directed; poles are minimum height (25 feet)</td>
<td>N/A</td>
<td>Engineering</td>
<td>Completed</td>
</tr>
<tr>
<td>Signage lights (6)</td>
<td>Lights are downward angled; lights are low to ground (1-2 ft.); lights are low wattage</td>
<td>N/A</td>
<td>Engineering</td>
<td>Completed</td>
</tr>
<tr>
<td>Wall-pack lights (332)</td>
<td>Lights are angled down; lights are shielded (either by eaves overhang or retrofit shields)</td>
<td>N/A</td>
<td>Engineering</td>
<td>Completed</td>
</tr>
<tr>
<td>Landscaping &amp; grounds lighting (18 pagodas and 40 bollard lights)</td>
<td>Most grounds and accents lights directed downward; others shielded by vegetation; grounds lights low to ground.</td>
<td>N/A</td>
<td>Engineering</td>
<td>Completed</td>
</tr>
<tr>
<td>Individual guest room interior lights</td>
<td>Avoidance Measures</td>
<td></td>
<td>Security</td>
<td>Completed</td>
</tr>
<tr>
<td></td>
<td>1. Encourage guests to switch off unnecessary room lighting. See Appendix D (guest brochure). The hotel also places an awareness poster in the lobby during seabird seasons.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Encourage guests to cover room windows at night during fallout season Minimization Measures.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. All guest room windows were tinted to reduce amount of light visible from the exterior.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimization Measures</td>
<td>Describe minimization method (e.g. trapping, outreach, enact policy)</td>
<td>Cost to Implement</td>
<td>Responsible Staff</td>
<td></td>
</tr>
<tr>
<td>--------------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------</td>
<td>------------------</td>
<td>-----------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Remove &amp; control loose predatory animals at the facility. (Loose animals can kill grounded seabirds and this measure aims to prevent seabird mortality by animals.)</td>
<td>The Resort implements this measure. The resort deploys cat traps as needed.</td>
<td>N/A</td>
<td>Grounds department</td>
<td></td>
</tr>
<tr>
<td>Prohibit outdoor feeding of predatory animals. (Feeding animals attracts them to the site and this measure aims to reduce the presence of animals that can cause seabird mortality.)</td>
<td>The Resort implements this measure. Staff is trained that this is not allowed, and security monitors compliance</td>
<td>N/A</td>
<td>Management staff.</td>
<td></td>
</tr>
<tr>
<td>Conduct searches to recover downed birds at the property &amp; turn them into SOS following protocols (see monitoring plan below).</td>
<td>See Item 9 below.</td>
<td>N/A</td>
<td>Engineering, grounds and security staff.</td>
<td></td>
</tr>
<tr>
<td>Train staff to follow minimization measures.</td>
<td>See Item 9 below, and Appendix C.</td>
<td>N/A</td>
<td>Management staff.</td>
<td></td>
</tr>
</tbody>
</table>
Item 9. Take Monitoring Plan. Provide a plan to monitor take of the Covered Seabirds at the facilities proposed to be covered by the incidental take permit/license. The take monitoring plan describes how the property will be searched for downed Covered Seabirds. The KSHCP document provides standards and guidelines for take monitoring to ensure that take of the species is accurately measured and recorded.

The regulatory agencies will make the final determination as to the adequacy of the take monitoring plan.

In 2012 the Sheraton Kauai Resort developed a Standard Operating Procedures (SOP) for patrolling, monitoring, documenting and reporting downed seabirds during the fledgling flight season (see Appendix E, SOP attachment). This document was updated in 2019. The General Manager, or designee, will continue to update the SOP as needed during the KSHCP permit term, to reflect best practices for finding, recovering and documenting any downed seabirds.
<table>
<thead>
<tr>
<th>Item</th>
<th>Protocol (fill in protocol &amp; provide reasons)</th>
<th>KSHCP Guideline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage of the total property that will be searched &amp; the total area to be searched</td>
<td>The entire built upon portion of the property is inspected each Day, year round. Rooftops are checked by engineering, housekeepers check balconies, and grounds are checked by security and groundskeepers. Groundskeepers also check shrubbery and bushes (la‘u‘e fern and naupaka). All open areas are visually checked by all associates and guests.</td>
<td>Search as much area as possible</td>
</tr>
<tr>
<td>Frequency of searches (# per day or per week)</td>
<td>The Resort is formally searched eight times a day by security, additional Seabird Awareness based searches are made 24/7 by associates.</td>
<td>Twice daily</td>
</tr>
<tr>
<td>Time of day of searches</td>
<td>Inspections are conducted throughout the day.</td>
<td>2-3 hours after sunset, and within 3 hours after sunrise</td>
</tr>
<tr>
<td>Number of searchers per search area</td>
<td>Two to three individual first responders as well as the entire staff of 200 or more employees</td>
<td>Depends on site conditions and safety considerations</td>
</tr>
<tr>
<td>Proposed training</td>
<td>See Items 7 and 9 above, and Appendix C.</td>
<td>Annual training covering seabird identification, seabird handling, response procedures, verified and documented</td>
</tr>
</tbody>
</table>
Item 10. Components of the Green Sea Turtle Minimization and Monitoring Plan (if required). Monitoring and minimization for the Green Sea Turtle is in two parts: A) Monitoring to detect nests and B) Monitoring and minimizing impacts to nests detected.

Part A: Monitoring to detect Green Sea Turtle Nests
Please provide the following information; the table below may be used and altered as needed.

1) Detailed location and description of beaches, including linear distance, at which searching for nests of the green sea turtle will take place. Searches should take place at any beach from which light at the facility can be viewed;

2) Monitoring protocols indicating:
   a) Annual training of searchers;
   b) Frequency of searches;
   c) Conduct active searching (searching the beach width);
   d) Sufficient number of trained searchers to cover the area; and
   e) Record results of search monitoring.

3) All Participants are required to record the results of search efforts. Records should provide:
   a) Evidence (what was seen). Include description and provide photographs
   b) Location on the beach (GPS) and physically mark the location if possible
   c) Date and time of day
   d) Description of surrounding land use (e.g., vacant, or developed), and
   e) Proximity to the facility.

Part B: Monitoring of Identified Green Sea Turtle Nests

Each identified nest of the green sea turtle should be monitored and protected from light attraction. Please provide the following monitoring protocols; the tables below may be used and altered as needed.

1. Light avoidance measure for identified nests (either shield/deactivate lights at the facility or install and maintain a light shield around each identified nest);
2. Frequency of searches;
3. Number of searches monitoring the nests. The number of needed to monitor active nests will depend on number of nests identified and amount of beach needed to be covered;
4. Record the results of nest monitoring. Monitoring should provide:
   a. Evidence of hatchling emergence (description and photos):
   b. Date and time of emergence,
   c. Direction of tracks
   d. Condition of the nest area (e.g., disturbed or not).
**Table 8: Green Sea Turtle Monitoring Protocols – Part A: Monitoring to Detect Nests**

<table>
<thead>
<tr>
<th>Item</th>
<th>Protocol (fill in protocol &amp; provide reasons)</th>
<th>KSHCP Guideline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location &amp; description of the beach, or beaches, surveyed and the linear distance of the beach.</td>
<td>The beach fronting the Resort is approximately 2008 linear feet long, and is located fronting the luau garden and pool</td>
<td>Beach area surveyed should coincide with visibility from the facility with the lights.</td>
</tr>
<tr>
<td>Frequency of searches (# per day or per week)</td>
<td>The beach is searched a minimum of eight times a day by security officers.</td>
<td>Weekly during nesting season (typ. May 15 to end of August)</td>
</tr>
<tr>
<td>Number of searchers per search area</td>
<td>Various</td>
<td>Depends on site conditions and safety considerations</td>
</tr>
<tr>
<td>Proposed training</td>
<td>N/A. The hotel has never had nesting turtles on the beach.</td>
<td>Searchers should receive annual training conducted by the DLNR or the USFWS, or their designee.</td>
</tr>
</tbody>
</table>
Table 9: Green Sea Turtle Monitoring Protocols – Part B: Monitoring of Identified Nests & Minimization

<table>
<thead>
<tr>
<th>Item</th>
<th>Protocol (fill in protocol &amp; provide reasons)</th>
<th>KSHCP Guideline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency of searches</td>
<td>The beach is searched eight times a day. It should be noted that, there has never been a nest recorded on the beach since the hotel has been in operation. Should a nest be discovered the Resort would immediately contact USFWS and follow their standard Hawaii protocols for protecting the nest.</td>
<td>Active nests should be monitored every 1-2 days; then daily during expected hatching date</td>
</tr>
<tr>
<td>Light avoidance</td>
<td>N/A</td>
<td>If lights cannot be deactivated or shielded from the nest, each nest should be screened from visible light.</td>
</tr>
<tr>
<td>Number of searchers per search area</td>
<td>Various</td>
<td>Depends on site conditions and safety considerations</td>
</tr>
</tbody>
</table>
Item 11. Describe the schedule that will be followed to provide training for staff. Training must be provided to those that will conduct and oversee the searches at the facility.

The training should include:

1. Summary of regulations protecting the Covered Species;
2. Search procedures, route, frequency and timing specific to the facility’s monitoring plan, for seabirds and green sea turtle nests (if applicable);
3. Response procedures including safe and proper techniques for handling seabirds;
4. Recognizing evidence of green sea turtle nests, proper nest light screening, and hatchling activity (if green sea turtle minimization and monitoring plan is applicable);
5. Procedures to document the results of searches;
6. Downed wildlife agency contacts; and
7. Nearest SOS aid station.

The Division of Forestry and Wildlife provided annual Worker Seabird Awareness and Response Training to the appropriate facility staff prior to the start of each seabird fallout season from 2003 to 2017. Worker training will continue under the KSHCP for the duration of the permit term. Seabird Awareness Training will be conducted by a trained biologist in 2019, and in subsequent years, the training will be conducted by the Manager of Security. The fallout season occurs each year from September 15 to December 15. The training includes: regulatory setting, consequences for noncompliance, standard monitoring, response, and reporting procedures, techniques for proper handling of downed seabirds, personal protection, agency contacts and facility locations.

A copy of the PowerPoint training module is attached as Appendix C. See also Standard Operating Procedures (SOP) (Appendix E).

Item 12. Describe any outreach conducted (e.g., handing out pamphlets on seabird awareness to facility employees or guests,):

The Sheraton Kauai Resort has been doing outreach to staff and guests since 2003, and will continue to do so during the KSHCP permit term. During the seabird fledging season Kauai Marriott Resort will:

1. Display SOS informational posters in break rooms and common staff areas.
2. Put it in our Daily Events Calendar which is our daily hotel newsletter for all Employees.
3. Staff will attend the annual Worker Seabird Awareness Training.
4. Remind staff about seabirds during department Daily Focus meeting (pre-shift meetings) to bring additional awareness.
5. Talk about it in our Monday, Wednesday, and Friday Managers weekly stand up meetings.

6. Invite a qualified biologist to speak at our staff meeting.

7. Display SOS informational posters in the lobby to promote guest awareness.

8. Have an informational flyer put into each room as awareness to for our guest, asking them to keep curtains closed during the season, Appendix D.

9. Show information regarding the seabird fallout season and appropriate protocols that guests should follow on the in-house TV station during the seabird season. The information will show up on the “Splash Page”, this is the pane that shows when the TV is first turned on.
PART 2. Take Estimate, Requested Amount of Take Authorization, and Funding

Item 1. Show the calculation of estimated take for each of the Covered Species.

Following the take estimation methods in the KSHCP for estimating a Participant’s take (Section 6.2.2), the tables below show the take estimate calculation for the facility(s) for each of the Covered Seabirds.

The KSHCP take estimate method utilizes the average of the most recent 5 years of SOS recovery data for the facility. Applied to the data is an adjustment for downed birds not found, based on a 50% discovery rate and an adjustment based on SOS mortality (birds dead on arrival or those that die in care) – average SOS mortality is 12%.

If the landowner-applicant submits a take estimate with an alternate discovery rate, they must provide the reasons why an alternate rate was used to estimate take, including relevant information supporting their reasoning (% of searchable area, search protocols that will be used, any searcher efficiency trials that have been or will be conducted at facilities and/or demonstration of quick, effective recovery of birds). Please include narrative and/or photos and maps to support this.

We have used the numbers generated by the SOS program, and verified through our own database to determine take. To determine the searcher efficiency of the property we calculated the amount of the property that is difficult to search due to the fact that slightly less than 2 acres are not developed and have rank vegetation on them. From those calculations we determined that we could not effectively search slightly less than 10% of the property.

Table 10: Annual Take Calculation

<table>
<thead>
<tr>
<th></th>
<th>Newell's Shearwater</th>
<th>Hawaiian Petrel</th>
<th>Band-rumped Storm-Petrel</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Annual average number (SOS data – or – monitoring data) of downed NESH (5 most recent years), HAPE or BRSP (15 most recent years)</td>
<td>2.40</td>
<td>-</td>
<td>.07</td>
</tr>
<tr>
<td>2. Annual observed lethal take estimate (12% of 1, all downed birds)</td>
<td>0.29</td>
<td>0</td>
<td>0.008</td>
</tr>
<tr>
<td>3. Adjustment for unobserved take (10% not searchable vs 50% typical)</td>
<td>0.24</td>
<td>0</td>
<td>.07</td>
</tr>
<tr>
<td>4. Total estimated annual lethal take from light attraction (2+3)</td>
<td>0.53</td>
<td>0</td>
<td>0.078</td>
</tr>
</tbody>
</table>

Requested Annual Lethal Take

<table>
<thead>
<tr>
<th></th>
<th>Newell's Shearwater</th>
<th>Hawaiian Petrel</th>
<th>Band-rumped Storm-Petrel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Requested Annual Lethal Take</td>
<td>0.53</td>
<td>0</td>
<td>0.08</td>
</tr>
</tbody>
</table>
Item 2. Select the requested take authorization and permit/license term coverage for each of the Covered Species.

**Newell’s Shearwater:**

<table>
<thead>
<tr>
<th>Age Class</th>
<th>Annual Take Estimate: Fledglings</th>
<th>Annual Take Estimate: Adults or sub-adults</th>
<th>Take Limit for License/Permit Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortality (Lethal)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Injury (Non-lethal)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Hawaiian Petrel:**

<table>
<thead>
<tr>
<th>Age Class</th>
<th>Annual Take Estimate: Fledglings</th>
<th>Annual Take Estimate: Adults or sub-adults</th>
<th>Take Limit for License/Permit Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortality (Lethal)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Injury (Non-lethal)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Band-rumped Storm Petrel:**

<table>
<thead>
<tr>
<th>Age Class</th>
<th>Annual Take Estimate: Fledglings</th>
<th>Annual Take Estimate: Adults or sub-adults</th>
<th>Take Limit for License/Permit Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortality (Lethal)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Injury (Non-lethal)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Item 3. Funding Assurance. **Provide proof of adequate funding (see KSHCP document).** All participants must demonstrate requisite funding prior to permit/license approval to ensure that the proposed measures and actions, including monitoring, will be undertaken in accordance with the terms and schedule of the KSHCP.

Sheraton Kauai Resort **currently undertakes all minimization and conducts all monitoring using its existing staff as part of annual operating budget, and will continue to do so through the term of the KSHCP.** The Sheraton Kauai Resort will provide financial assurances as required by the KSHCP.

Signature of Participant: ________________________________________________

Printed Name: ________________________________________________________ Date:_________________

The undersigned affirms that all the information included is true and accurate to the best of the participant’s knowledge and that this PIP is voluntarily submitted.

Chech to waive confidentiality

Contact Us
Call the KSHCP Office at (808) 245-9160 or visit our office at 4272-B Rice Street, Līhu’e HI, 96766. Visit the project website: www.KauaiKaua’i-seabirdhcp.info. We look forward to working with you toward helping Hawai’i’s unique species!
1. Appendices

Appendix A – Tax Map Keys (TMKs) of the Sheraton Kauai Resort

Appendix B – Schematic layout of the Resort

Appendix C – Sheraton Kauai Resort Seabird Awareness and Response Training module

Appendix D – Guest Seabird Conservation Program brochure

Appendix E – Sheraton Kauai Resort – Seabird Standard Operating Procedures and Recovery Protocols

Appendix F – Downed Wildlife Form
Appendix A

Sheraton Kauai Resort – Tax Maps
Appendix B

Sheraton Kauai Resort – Schematic Layout of the Resort
Purpose of Training

- Native seabird species including endangered species may “fallout” on the Resort property on a seasonal basis.
- Sheraton Kauai Resort is committed to the protection of these species.
- Sheraton Kauai Resort has specific endangered bird protocols in place that all construction personnel must follow.
- There are potentially significant legal implications if any of these protocols are not followed.
Regulatory Setting - Protected Species

Federal -
The Endangered Species Act of 1973, as amended (ESA)
Migratory Bird Treaty Act (MBTA)

State of Hawai‘i -
Hawaii Revised Statutes (Chapter 195-D)

IT IS ILLEGAL TO:

“harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct” any species listed under any of these statutes
Agency and Endangered Species Program Contacts

Who to Call

State Department Land & Natural Resources DOFAW

Thomas Kaiakapu: Wildlife Manager: (808) 274-3440

Sheraton Kauai Resort Program Coordinator

In house contact

Joseph Kaneakua: Security Manager Cell (808)346-8795

Reggie David: Cell: (808) 937-0124, email: davidr003@hawaii.rr.com
Endangered and Threatened Seabird Species

Newell’s Shearwater

Hawaiian Petrel

Band-rumped Storm-Petrel
Seabird Fallout Season Issues

• Night flying seabirds are often attracted to lights
• Fledgling (*keiki*) birds on their way to sea for the first time are often attracted to lights and can be confused by them
• Confused birds may collide with structures, or simply land on the ground too tired to continue flying
Seabird Issues cont.

• Once on the ground they cannot take off again and will die from starvation or be killed by predators if not rescued

• If the seabirds are recovered and turned into the Save Our Shearwaters Program (SOS), almost 90% of them can be returned to the wild
Downed Seabird Response Protocols

• If a downed seabird is found, immediately call your supervisor and the Global Safety and Security in-house number 4067. Or call Rapid Response by dialing 0 and ask for an Officer on duty.

• Stay with the bird until a Safety and Security officer arrives on the scene, follow their instructions.
Take Home Message

• The harming of listed seabirds may be construed as “take” under the ESA, and/or HRS 195D.

• The minimization and avoidance of “take” to the maximum extent practicable is required under both federal and State of Hawaii endangered species statutes.

• Failure to do so may result in enforcement action, which may result in a suspension or even termination.

• Penalties include civil fines of up to $25,000 per incident, and criminal fines of up to $50,000, and up to one year federal imprisonment per incident.

• Non compliance with any of the endangered species rules and protocols will result in immediate disciplinary action.
Mahalo

Sheraton Kauai Resort thanks you for your attention to and your assistance with this program.

Sheraton Kauai Resort takes pride in our continued efforts to protect the natural resources on the Island of Kaua‘i.

Protection of these native birds is everyone’s responsibility, and is in the common interest of the Island community and future generations.
If You Would Like More Information

- Other questions? Please see me after the presentation
Appendix D

Guest Seabird Conservation Brochure

Currently under development
Appendix E
Sheraton Kauai Resort – Seabird Standard Operating Procedures and Recovery Protocols

Between September 1st and December 15th the Sheraton Kauai Resort and its associates will participate in the search, recovery and collection of the downed Seabirds (Newell’s Shearwater, Hawaiian Petrel, Band-rumped Storm-Petrel and other non-listed seabird species).

Training and Awareness

Hotel Management will participate in an annual Seabird Awareness and Response training.

Hotel Management will educate our guest by having literature (flyer) in the individual guest rooms and a poster in the lobby area explaining our conservation efforts and the SOS Program and the part that we play in that program.

The Hotel will educate their employees by putting information in the Daily Focus page. All daily pre-shift meetings will have Seabird Awareness and Response discussions during the seabird fallout season.

Prior to the start of the seabird fallout season, Hotel Management, will conduct a lighting audit of the Resort with a qualified seabird biologist. The objective of that survey will be to identify any lights on Resort grounds that might attract sea birds to our property. Engineering or the grounds department will make the appropriate adjustments to light fixtures as needed. Additionally it may be necessary to turn off of certain specific lights during the seabird season – a SOP for which lights will be turned off will be developed of needed

Security officers will keep a log of birds recovered on the property, with all pertinent data. They will also complete filling the “White Board” on the SOS Aid Station that is attached to the Station with the following information:
Date:
Time:
Location found:
Condition of bird: (Good) (Injured) (Dead)
Type: Newell’s Shearwater – Hawaiian Petrel – Storm Petrel, other – (if known)

Monitoring

Safety & Security officers (2) plus one Supervisor (1) and one duty engineer (1) will make it part of their duties during the Seabird season to be vigilant about looking for down Seabirds during their respective shifts.
5. Turn in the completed form to the Security Manager
6. Note in the nightly log where the bird was found, or if found off property

**Reporting to Agencies:**

A call shall be made to the USFWS and DOFAW within 24 hours of a downed bird being recovered on the property.

If a dead bird is recovered follow the instructions received from DOFAW-Kauai Branch, they will most likely pick up the carcass, but in some circumstances instruct the Resort to dispose of the carcass.

A copy of the Downed Wildlife form in .pdf format will be submitted via email to both the USFWS and DOFAW within 72 hours.

**Contacts:**

USFWS – Consultation Lead

DLNR-DOFAW- Consultation Lead and  

These will be updated once the agencies determine the point people for this consultation

This policy is subject to periodic review.
Appendix F
DLNR Downed Seabird Form

This will be added prior to permit issuance, as this form has gone through many iterations
Kauaʻi Seabird Habitat Conservation Program (KSHCP)

Participant Inclusion Plan (PIP)

Name of Applicant/Participant: County of Kauaʻi
Part 1: Landowner & Property Information; Description of the Facilities; Avoidance & Minimization Measures; Monitoring of Take

**Item 1.** Provide the name of the landowner, business, agency, or institution and complete contact information. If the applicant/participant is different from the landowner, please attach power of attorney (or other documentation) allowing the party to act on the landowner’s behalf.

Submitted on behalf of the County of Kaua‘i by:

Mr. Patrick Porter  
Director, Department of Parks & Recreation, County of Kaua‘i  
4444 Rice Street, Suite 105  
Līhu‘e, Hawai‘i 96766

Note: Power of attorney for the County cannot be granted without the concurrence of the County Council.

Primary Contact:

Mr. William Trugillo  
Chief of Planning and Development, Department of Parks and Recreation

**Item 2.** Provide the legal description of the property at which the existing facilities and Covered Activities are located, including Tax Map Key (TMK) number. Provide a survey of the property and site plan drawings showing the locations of the Covered Activities (lights), property boundaries, buildings & structures, and site features. If properties containing the Covered Activities comprise separate parcels please include all Tax Map Key numbers and maps.

Existing facilities at which the Covered Activities occur are the same facilities at which take authorization is sought. As such, responses to Item 2 and Item 3 are addressed together. Please see Item 3.

**Item 3.** Describe the existing Covered Activities for which incidental take authorization is sought. Include list of buildings, type and description of lights present, purpose and location of lights and current seabird lighting accommodation in place (e.g. shielding, downward pointing, switched off during fledging season, etc.). For “Types of lights” please use the following categories:

- Parking Lights
- Signage Illumination
- Wall-pack Building Lights
- Landscaping/Grounds/Accent/Bollards
- Indoor Lights Visible from Outdoors
- Roof Floodlights
- Other Lights
Facility lighting plan may be submitted as lighting inventory. Photos may be attached. The suggested light table, and Green Sea Turtle assessment table below may each be modified as needed to provide the necessary information.

The County of Kaua’i (the “County”) wishes to have all of its facilities included in the Kaua’i Seabird Habitat Conservation Plan (“KSHCP”) and covered by the Incidental Take Permit/Incidental Take License (ITP/ITL) that will be issued if this application is approved.

**Lighting Inventory**

The County uses a wide variety of lights at its facilities. Over the past decade, stray light has been minimized to the maximum extent practicable by either replacing or modifying the fixtures, or by instituting operational procedures and controls that prevent or minimize their use during periods when they are likely to disorient protected seabirds.

It is not practicable or useful to list every fixture showing all makes, models, and styles in use. Even if that were practicable, ensuring that such a list is kept up-to-date for every fixture would be administratively burdensome without yielding commensurate benefit. Consequently, for the purpose of this application, the County has worked with KSHCP staff to establish categories of facilities characterized primarily by the types of lighting and uses present at each of its facilities. These categories are shown below in Table 1.

The facilities that fall into each of the five categories are listed in alphabetical order and by category in Attachment A, County Facility Listing to the KSHCP. Attachment A contains a list of the facilities (current as of October 31, 2018) that the County wishes to be covered under the ITL/ITP. The County will update the list of facilities annually to the best of its ability and will make the then-current version of the listing available to the agencies in its annual report. Please note that unlit and very minor, lit facilities which do not have the potential to affect Covered Species are included in the listing.

Attachment B contains maps and graphics showing the location and characteristics of lighting at County facilities for which the County believes site-specific information is relevant. This demonstrates that the County is complying with the requirements of downward directed, shielded lighting, and the placement of lights under eaves. The County has already adjusted lighting at certain facilities to ensure that it does not employ more lighting than is needed for public safety and effective operation.

Attachment C, Attachment D, Attachment E, and Attachment F contain photographs illustrating the types of lighting in each of the four categories of lighted facilities. These are examples illustrating the specific fixtures; they are not intended to depict the possibilities, nor to prescribe specific makes, models, or styles. There are circumstances that will require the use of portable flood lights by County personnel and its contractors. In order to address any impacts this activity may have on the Covered Species, a draft policy and standard operating procedure is included as Attachment H.
Table 1. Facility Classification

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>NO. OF FACILITIES</th>
<th>USAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Minimal Lighting</td>
<td>17</td>
<td>Facilities with minimal structural and/or parking lighting and/or lights are used infrequently. This includes such things as neighborhood centers, base yards, and some beach parks. Some of the facilities in this category have lights that are under eaves or in other situations which prevent the light from shining directly outward. In general, none of the lamps present exceed 100 watts.</td>
</tr>
<tr>
<td>3. Limited External Lighting</td>
<td>37</td>
<td>Facilities with low levels (in lumens or on-time) of external building lighting or lit parking areas. In general, these facilities have a sufficient number of external lights to prevent their inclusion in Category 2, but whose lights can be managed and/or readily retrofitted so as to limit the release of stray light to insignificant levels and/or very short periods of time during sensitive periods.</td>
</tr>
<tr>
<td>4. Substantial Exterior Area &amp; Court Lighting</td>
<td>11</td>
<td>Facilities with multiple high intensity lights and with significant area coverage. This category includes court lights (e.g., basketball courts, tennis courts, skateboard parks, volleyball courts, etc.) or significant external lighting such as parking or recreational areas (e.g. Kaua‘i War Memorial Convention Center).</td>
</tr>
<tr>
<td>5. High-Intensity Stadium &amp; Field Lighting</td>
<td>12</td>
<td>Facilities which have numerous, frequently used, high-intensity light fixtures and whose use cannot be limited to non-seabird seasons. This category includes facilities that have field and stadium lights on high poles which by their nature are difficult to minimize.</td>
</tr>
</tbody>
</table>

Note 1: Tabulation was taken as of October 31, 2018. The number of facilities, and possibly the categorization of individual facilities, will change over time as the County removes old facilities, adds new ones, and replaces older lighting fixtures.

Note 2: Attachment C illustrates Category 3 lighting; Attachment D illustrates Category 4 lighting; and Attachments E and F illustrate Category 5 lighting.

Note 3: Where lights are removed from a facility, qualifying it for a lower category designation, that change will be documented in the annual report submitted by the County.

Note 4: In the decade since the KSHCP process began, the County facilities in Category 5 have been minimized to the extent that the County no longer has facilities which meet the Category 5 definition.
Honu - Green Sea Turtle (*Chelonia mydas*) Assessment

Potential for Harm at Known Sea Turtle Nesting Areas.

Denise Parker and George Balazs (December 2015) of the NOAA-PIFSC Marine Turtle Research Program prepared a report showing known marine turtle nesting and basking areas in the Hawaiian Islands. Known nesting locations on Kaua‘i, as identified in the report, are reproduced as Figure 1 - NOAA - PIFSC and Table 2 - NOAA-PIFSC.

Figure 1. Known Green Sea Turtle Nesting Locations on Kaua‘i

Table 2. Green turtle (*Chelonia mydas*) nesting locations recorded on Kauaʻi

<table>
<thead>
<tr>
<th>PLACE NAME</th>
<th>LATITUDE (N)</th>
<th>LONGITUDE (W)</th>
<th>MAGNITUDE</th>
<th>FREQUENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lāwaʻi Kai</td>
<td>21° 53.3’</td>
<td>159° 30.1’</td>
<td>1-2</td>
<td>Regular</td>
</tr>
<tr>
<td>Wahiawa</td>
<td>21° 53.8’</td>
<td>159° 34.5’</td>
<td>&lt;1</td>
<td>Intermittent</td>
</tr>
<tr>
<td>Salt Pond County Beach Park</td>
<td>21° 54.0’</td>
<td>159° 36.4’</td>
<td>&lt;1</td>
<td>Intermittent</td>
</tr>
<tr>
<td>PMRF, Pacific Missile Range Facility Housing</td>
<td>21° 59.8’</td>
<td>159° 46.1’</td>
<td>&lt;1</td>
<td>Intermittent</td>
</tr>
<tr>
<td>Barking Sands</td>
<td>22° 3.9’</td>
<td>159° 46.9’</td>
<td>&lt;1</td>
<td>Intermittent</td>
</tr>
<tr>
<td>Nohi l ditch</td>
<td>22° 3.2’</td>
<td>159° 47.0’</td>
<td>&lt;1</td>
<td>Intermittent</td>
</tr>
<tr>
<td>Miloli‘i</td>
<td>22° 9.1’</td>
<td>159° 43.1’</td>
<td>&lt;1</td>
<td>Intermittent</td>
</tr>
<tr>
<td>Kalihikai</td>
<td>22° 13.6’</td>
<td>159° 26.9’</td>
<td>&lt;1</td>
<td>Intermittent</td>
</tr>
<tr>
<td>Kauapea (Secret Beach)</td>
<td>22° 13.4’</td>
<td>159° 24.7’</td>
<td>&lt;1</td>
<td>Unknown</td>
</tr>
<tr>
<td>Wailapa</td>
<td>22° 13.0’</td>
<td>159° 23.1’</td>
<td>&lt;1</td>
<td>Unknown</td>
</tr>
<tr>
<td>Pila‘a</td>
<td>22° 12.7’</td>
<td>159° 21.9’</td>
<td>&lt;1</td>
<td>Unknown</td>
</tr>
<tr>
<td>Lepeʻuli, (Larsen’s Beach)</td>
<td>22° 12.3’</td>
<td>159° 20.3’</td>
<td>&lt;1</td>
<td>Unknown</td>
</tr>
<tr>
<td>Moloa‘a</td>
<td>22° 11.6’</td>
<td>159° 20.0’</td>
<td>&lt;1</td>
<td>Unknown</td>
</tr>
<tr>
<td>Papa</td>
<td>22° 10.4’</td>
<td>159° 18.8’</td>
<td>&lt;1</td>
<td>Unknown</td>
</tr>
<tr>
<td>Keālia</td>
<td>22° 5.9’</td>
<td>159° 18.3’</td>
<td>&lt;1</td>
<td>Unknown</td>
</tr>
<tr>
<td>Wailua</td>
<td>22° 3.0’</td>
<td>159° 20.2’</td>
<td>&lt;1</td>
<td>Unknown</td>
</tr>
<tr>
<td>Nukoli‘i</td>
<td>22° 0.4’</td>
<td>159° 20.2’</td>
<td>&lt;1</td>
<td>Unknown</td>
</tr>
<tr>
<td>Ninini, Nāwiliwili</td>
<td>21° 57.5’</td>
<td>159° 20.3’</td>
<td>&lt;1</td>
<td>Unknown</td>
</tr>
<tr>
<td>Kīpū Kāi</td>
<td>21° 54.8’</td>
<td>159° 23.6’</td>
<td>1-2</td>
<td>Regular</td>
</tr>
<tr>
<td>Keoniloa, Po‘ipū</td>
<td>21° 51.5’</td>
<td>159° 26.3’</td>
<td>&lt;1</td>
<td>Intermittent</td>
</tr>
</tbody>
</table>


Table 3 contains specific information about County facilities that have characteristics (e.g., sandy beaches, reported turtle nesting, or basking area) that make interaction possible. Of all the known nesting locations on Kauaʻi, only two are adjacent to land owned by the County, Salt Pond Park and Wailua Beach Park. The County facilities at those locations are not lighted during the turtle nesting season and, thus, do not have the potential for light attraction. The nesting locations themselves are below the certified shoreline and are subject to State rather than County jurisdiction. Consequently, the County is not in a position to erect blinds or other visual barriers that would prevent light attraction.

**Potential for Harm at Potential Sea Turtle Nesting Areas.**

In preparing this application, the County considered the possibility that during the term of the permit turtles might nest at locations where such behavior has not previously been documented (i.e., do not appear in Parker and Balazs’ report) but which have suitable shoreline characteristics. Table 3 lists all the facilities that the County owns and operates that are near potential nesting areas. None of the facilities have lights visible from areas suitable for nesting and, thus, present no risk of harm.
<table>
<thead>
<tr>
<th>LOCATION</th>
<th>TAX MAP KEY</th>
<th>Light Type</th>
<th>No. Of Lamps</th>
<th>Regular Usage</th>
<th>Frequency of Night Usage</th>
<th>Duration of Night Usage</th>
<th>Observed Nesting?</th>
<th>Observed Basking?</th>
<th>Sandy Shoreline</th>
<th>Risk of Harm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anahola Beach Park</td>
<td>4-8-014-006</td>
<td>No exterior lights.</td>
<td>0</td>
<td>n/a</td>
<td>None</td>
<td>n/a</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No. No lights visible from areas suitable for nesting.</td>
</tr>
<tr>
<td>Anini Beach Park</td>
<td>5-3-05-05</td>
<td>No exterior lights.</td>
<td>0</td>
<td>n/a</td>
<td>None</td>
<td>n/a</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No. No lights visible from areas suitable for nesting.</td>
</tr>
<tr>
<td>Blackpot Beach Park</td>
<td>5-5-001-004</td>
<td>No exterior lights, but vehicle lights.</td>
<td>0</td>
<td>n/a</td>
<td>None</td>
<td>n/a</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No. No lights visible from areas suitable for nesting.</td>
</tr>
<tr>
<td>Hāʻena Beach Park</td>
<td>5-9-05-19</td>
<td>No exterior lights.</td>
<td>0</td>
<td>n/a</td>
<td>None</td>
<td>n/a</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No. No lights visible from areas suitable for nesting.</td>
</tr>
<tr>
<td>Hanalei Pavilion</td>
<td>5-5-02-19</td>
<td>No exterior lights.</td>
<td>0</td>
<td>n/a</td>
<td>None</td>
<td>n/a</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No. No lights visible from areas suitable for nesting.</td>
</tr>
<tr>
<td>Hanamāʻulu Beach Park Pavilion</td>
<td>3-7-03-08</td>
<td>No exterior lights.</td>
<td>0</td>
<td>n/a</td>
<td>None</td>
<td>n/a</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No. No lights visible from areas suitable for nesting.</td>
</tr>
<tr>
<td>Hanapepe River Mouth Open Park Pavilion</td>
<td>1-9-08-07</td>
<td>No exterior lights.</td>
<td>0</td>
<td>n/a</td>
<td>None</td>
<td>n/a</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No. No lights visible from areas suitable for nesting.</td>
</tr>
<tr>
<td>Kapaʻa Beach Park</td>
<td>4-5-11-06</td>
<td>No exterior lights.</td>
<td>0</td>
<td>n/a</td>
<td>None</td>
<td>n/a</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No. No lights visible from areas suitable for nesting.</td>
</tr>
<tr>
<td>Kapaʻa Neighborhood Center</td>
<td>4-5-012-015</td>
<td>HPS Parking Lot Lights, Exterior Security Lights</td>
<td>4</td>
<td>Y</td>
<td>M-F Nights Only</td>
<td>6:00-7:30PM</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No. No lights visible from areas suitable for nesting.</td>
</tr>
<tr>
<td>Kapaʻa Swimming Pool &amp; Bath House</td>
<td>4-5-012-001</td>
<td>4 1000-watt Pool Lights</td>
<td>0</td>
<td>n/a</td>
<td>None</td>
<td>n/a</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No. No lights visible from areas suitable for nesting.</td>
</tr>
<tr>
<td>Kauai Sands Pump Station</td>
<td>4-3-02-12</td>
<td>No exterior lights.</td>
<td>2</td>
<td>Y</td>
<td>All week</td>
<td>All night</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No. No lights visible from areas suitable for nesting.</td>
</tr>
<tr>
<td>Lucy Wright Park</td>
<td>1-6-06-01</td>
<td>HPS Parking Lot Lights</td>
<td>2</td>
<td>Y</td>
<td>All week</td>
<td>All night</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No. Photo cell activated.</td>
</tr>
<tr>
<td>LOCATION</td>
<td>TAX MAP KEY</td>
<td>Light Type</td>
<td>No. Of Lamps</td>
<td>Regular Usage</td>
<td>Frequency of Night Usage</td>
<td>Duration of Night Usage</td>
<td>Observed Nesting?</td>
<td>Observed Basking?</td>
<td>Sandy Shoreline</td>
<td>Risk of Harm</td>
</tr>
<tr>
<td>--------------------------------</td>
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<td>------------------</td>
<td>---------------</td>
<td>-------------------------------------------------</td>
</tr>
<tr>
<td>Lydgate</td>
<td>3-9-06-01</td>
<td>100-watt sodium</td>
<td>7</td>
<td>Y</td>
<td>Daily</td>
<td>Dusk to dawn</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No. No lights visible from areas suitable for nesting.</td>
</tr>
<tr>
<td>Nāwiliwili Park</td>
<td>3-2-04-05</td>
<td>No exterior lights</td>
<td>0</td>
<td>n/a</td>
<td>None</td>
<td>n/a</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No. No lights visible from areas suitable for nesting.</td>
</tr>
<tr>
<td>Ni‘umalu Park</td>
<td>3-2-02-01</td>
<td>No exterior lights</td>
<td>0</td>
<td>n/a</td>
<td>None</td>
<td>n/a</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No. No lights visible from areas suitable for nesting.</td>
</tr>
<tr>
<td>Po‘ipū Beach Park</td>
<td>2-8-17-01</td>
<td>No exterior lights</td>
<td>0</td>
<td>n/a</td>
<td>None</td>
<td>n/a</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No. No lights visible from areas suitable for nesting.</td>
</tr>
<tr>
<td>Salt Pond Park</td>
<td>1-8-08-43</td>
<td>HPS Parking Lot</td>
<td>6</td>
<td>Y</td>
<td>Upon request.</td>
<td>6:00-10:00 PM</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No. No lights visible from areas suitable for nesting.</td>
</tr>
<tr>
<td>Wailua Beach Lifeguard</td>
<td>4-1-04-20</td>
<td>No exterior lights</td>
<td>6</td>
<td>Y</td>
<td>5-7 days a week</td>
<td>Upon request.</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No. No lights visible from areas suitable for nesting.</td>
</tr>
<tr>
<td>Station (Park)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wai‘oli Town Park</td>
<td>5-5-06-08</td>
<td>8 Metal Halide Lamps</td>
<td>0</td>
<td>n/a</td>
<td>None</td>
<td>n/a</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No. No lights visible from areas suitable for nesting.</td>
</tr>
<tr>
<td>Wai‘oli Beach Park</td>
<td>5-5-04-02</td>
<td>No exterior lights</td>
<td>0</td>
<td>N</td>
<td>None</td>
<td>n/a</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No. No lights visible from areas suitable for nesting.</td>
</tr>
</tbody>
</table>


Note 2: Low-intensity inside lights, lights under roof that point downward, and other small lights that do not shine toward ocean are not classified as exterior lights.

Note 3: All of these facilities are inland of the certified shoreline which is typically defined as the vegetation line.
Item 4. If applicable, describe any lighting standards (e.g., foot candles/area) required for facility operations or other requirements that necessitate the use of lighting (e.g., required for security, safety, operations). Describe the relevant standard, or regulation, and the areas and Covered Activities at the site (e.g., type of lighting) to which it applies.

There are numerous regulations that govern the use and desirable intensity of lights at County facilities. Some of these are regulatory standards, while others are simply recommendations and guidance documents. Relevant standards for County operations are summarized below. The County is not in a position to impose other conditions on private development.

- The County has adopted the International Building Code, and all construction and renovation must comply with the provisions of the code, including those related to lighting.
- The County must comply with the requirements of the State of Hawaiʻi Occupational Safety and Health Program (which implements the Federal Occupational Safety and Health Act of 1970) as they pertain to workplace lighting. The Hawaiʻi Department of Labor and Industrial Relations administers the Hawaiʻi OSH Law (Chapter 396, H.R.S.) through its Hawaiʻi Occupational Safety and Health Division (HIOSH) and has the authority to enforce all laws and standards concerning safety and health at the worksite. HIOUSH standards or rules are contained within Title 12, Subtitle 8 of the Hawaiʻi Administrative Rules.
- The Illuminating Engineering Society of North America publishes the Lighting Handbook (now in its tenth edition). It contains recommendations for lighting in a wide range of applications. While not regulatory, the Lighting Handbook does define best practices and, therefore, forms the basis for possible lawsuits against the County in areas where these practices are not followed. Consequently, the County generally follows the recommendations in the handbook when designing and retrofitting its facilities.
- The Illuminating Engineering Society of North America also publishes a handbook that provides design guidance specifically for sports and recreational areas [Sports and Recreational Area Lighting (Report ID: RP-6-01)]. As is true of the recommendations in the Lighting Handbook, the design guidelines that are laid out in the document are not regulatory in nature, but they do establish “best management practices” that the County must follow if it is to limit possible liability.

Item 5. Describe any plans/proposals for future facilities or expansion of existing facilities. Include any proposed structures and lighting by type, purpose, location, and quantity. Plans (architecture and site plans), photos, and drawings can be attached.

Please note that the County’s long-range Capital Improvement Plan includes a number of possible future facilities that have not yet been fully funded or constructed. This list includes facilities in various stages of design and/or construction, and proposed facilities. The completion dates of these facilities, and whether these will ultimately be constructed, depend upon competing priorities of the County Administration(s), consequently, all dates are approximate and the list is subject to change. These facilities will have limited outdoor lighting qualifying each as Category 3 or less and none are expected to result in the take of Covered Species. Those facilities are listed in Table 4 below.
<table>
<thead>
<tr>
<th>Project</th>
<th>Expected Date of Completion</th>
<th>Description</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adolescent Treatment and Healing Center</td>
<td>2019</td>
<td>Construction activity limited to daylight hours during peak seabird fallout period; all outdoor lights will be shielded to prevent upward radiation; and exterior lights not needed for safety and security will be off during the fledgling period.</td>
<td>2</td>
</tr>
<tr>
<td>Bryan J. Baptiste Sports Complex Soccer Field</td>
<td>2020</td>
<td>New facility will include a lit comfort station. Low-output, fully shielded lights will be placed only at the entrance. Any use of external lighting will comply with the KSHCP.</td>
<td>3 or less</td>
</tr>
<tr>
<td>Helicopter Hangar</td>
<td>2020</td>
<td>Hangar will be on leased space at Līhuʻe Airport. Site will include apron lighting and be run 24/7 in accordance with Airport policy set by the State Department of Transportation. (Location undetermined.)</td>
<td>3</td>
</tr>
<tr>
<td>Kapaʻa Armory Building/ Mahelona Hospital Renovation</td>
<td>2020</td>
<td>Drawings are not yet available. The current Kapaʻa Armory Building is being used by the Kauaʻi Police Department as a substation under an Executive Order from the state. The project may entail a new addition to the Kapaʻa Armory B for additional office space or the construction of a new facility on the Mahelona Hospital grounds.</td>
<td>2</td>
</tr>
<tr>
<td>Koaʻe Affordable Housing Development</td>
<td>2020</td>
<td>All outdoor lights will be shielded to prevent upward radiation. Construction activity will follow the mitigation recommendations received in the EA and any use of external lighting will comply with the KSHCP.</td>
<td>3</td>
</tr>
<tr>
<td>Līhuʻe County Building and Annex (Piʻikoi Office Renovation)</td>
<td>2020</td>
<td>Renovation of the existing Piʻikoi building within the Civic Center complex to create additional office space for county workers. No additional exterior lights will be installed.</td>
<td>2</td>
</tr>
<tr>
<td>Līhuʻe Town Core Mobility Project</td>
<td>2019</td>
<td>All outdoor lights will be shielded to prevent upward radiation. Construction activity will follow the mitigation recommendations received in the EA and any use of external lighting will comply with the KSHCP.</td>
<td>2</td>
</tr>
<tr>
<td>Līhuʻe Wastewater Treatment Plant Food Waste to Energy Addition</td>
<td>2020</td>
<td>The existing facility will add a food waste to energy operation. The addition will be constructed with low-wattage, fully shielded lights to be placed at the entrance. They will be controlled by motion sensors, with a manual control override for use only under special circumstances.</td>
<td>3 or less</td>
</tr>
<tr>
<td>Project</td>
<td>Expected Date of Completion</td>
<td>Description</td>
<td>Category</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>----------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>----------</td>
</tr>
<tr>
<td>Lima Ola Affordable Housing</td>
<td>2021</td>
<td>All outdoor lights will be shielded to prevent upward radiation. Construction activity will follow the mitigation recommendations received in the EA and any use of external lighting will comply with the KSHCP.</td>
<td>3</td>
</tr>
<tr>
<td>Development</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New Landfill Facilities</td>
<td>2023</td>
<td>The facilities are not yet fully defined and drawings are not yet available. Expected completion is 2017. The site is close to the mountains, in relatively flat, open pastureland. Because operations will be 7 am to 5 pm (i.e., during daylight hours), no outside lighting is needed. Once the new landfill facilities come online, the old landfill will be decommissioned. Material Recovery Facilities that may be constructed at or near the landfill will not be run or owned by the County.</td>
<td>1 or 2</td>
</tr>
</tbody>
</table>

**Item 6. Pursuant to the Endangered Species Act (ESA), Section 10 (a)(2)(A)(iii), describe alternatives to avoid the taking considered and evaluated. Provide reasons why those alternatives are not being utilized. Alternatives can include operational or facility design changes (attach pages as needed). The tables below may be altered as needed.**

Attachment A, *County Facility Listing to the KSHCP*, contains a complete list of all covered County facilities and a discussion of specific avoidance and minimization measures for each facility and category. All lights are either fully shielded or off during the fledgling season with the exception of a few as indicated on Attachment A. The exceptions are needed for the safety of the public and/or to allow the facilities to perform their intended public function. All of the County’s choices fall into the “Restricted Usage of Lighting” alternative described in Section 8.3 of the KSHCP.

In addition to the detailed listing contained in Attachment A, information concerning the alternatives considered is summarized in Table 5.
Table 5. Seabird Light Attraction Minimization Measures Considered

<table>
<thead>
<tr>
<th>Minimization Measures Considered</th>
<th>Feasible?</th>
<th>If not Feasible, Provide Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change time of light use (lights off earlier)</td>
<td>Yes</td>
<td>The County has adjusted the time of light use at its facilities to the maximum extent possible. Further changes in the time of light use are not feasible while also meeting operational requirements.</td>
</tr>
<tr>
<td>Deactivate unnecessary lights</td>
<td>Yes</td>
<td>The County has deactivated lights at its facilities that are unnecessary. Further deactivation is not feasible while also meeting its safety, operational, and other obligations.</td>
</tr>
<tr>
<td>Replace all outdoor lights with full cut-off fixtures</td>
<td>Partial</td>
<td>The County has done this at all facilities where such lights provide satisfactory lighting.</td>
</tr>
<tr>
<td>Shield all outdoor lights with full cut-off shields</td>
<td>Partial</td>
<td>The County has done this at all facilities where such lights provide satisfactory lighting.</td>
</tr>
<tr>
<td>Angle all lights downward</td>
<td>Yes</td>
<td>The County has done this at all facilities where such lights provide satisfactory lighting.</td>
</tr>
<tr>
<td>Lower intensity (lumens) of outdoor lights</td>
<td>Yes</td>
<td>The County uses the lowest light levels that provide satisfactory performance and do not create unsafe conditions.</td>
</tr>
<tr>
<td>Change bulb color to non-white spectrum</td>
<td>Yes</td>
<td>No colors have been scientifically proven to reduce seabird light attraction in the kinds of light fixtures typically employed by the County.</td>
</tr>
<tr>
<td>Prohibit/control unleashed predatory animals; prohibit outdoor feeding of animals; require sealed rubbish containers</td>
<td>Yes</td>
<td>Section 22, Article 2 of the Kauai County Code requires that (with certain very specific exceptions) dogs must be leashed when off the owner’s property. Fines for violation range from $50 to $200. Section 22, Article 10 of the Kauai County Code requires dogs over three months of age to be licensed. Ordinance No. 965, which went into effect on February 14, 2014, establishes a cat licensing and spay/neuter program. Its purpose is to protect both cats and native wildlife by requiring that cats allowed to roam off their owner’s property and are four months of age be sterilized and have a license. The County offers refuse collection services as provided for in Chapter 21 of the County Code. Service is once per week and the County requires that the cart lid be fully closed prior to pickup.</td>
</tr>
<tr>
<td>Provide Worker Seabird Awareness Training to staff</td>
<td>Yes</td>
<td>The County provides such training.</td>
</tr>
<tr>
<td>Provide outreach materials to staff &amp; guests</td>
<td>Yes</td>
<td>The County provides such materials to staff.</td>
</tr>
<tr>
<td>Host Save Our Shearwaters (SOS) Aid Station</td>
<td>Yes</td>
<td>The County hosts numerous SOS Aid Stations.</td>
</tr>
</tbody>
</table>
Item 7. Describe all site-specific seabird minimization measures considered for the Covered Activities. This item should follow KSHCP minimization objectives and measures as specified in the KSHCP document. Please consult with staff from the DOFAW and the USFWS as needed. The suggested tables below can be altered as needed.

Minimization measures modify the Covered Activities to reduce the effects of the activity on the Covered Species. KSHCP Participants will be required to implement minimization measures that apply to the facility to the “maximum extent practicable” per applicable state and federal laws which regulate incidental take license/permit issuance by the DLNR and the USFWS.

Minimization also entails searching and recovering grounded seabirds to minimize the chance of mortality. In addition, the presence of on-site predators (i.e. feral cats, dogs) should be controlled and removed because these animals can prey on grounded seabirds.

Provide justification, such as policies, regulations, or other rationale for measures that will not be implemented.

a. The County has retrofitted all but one of its Category 4 and 5 facilities with shielded lighting. The exception is Waimea Tennis Courts, which will not be allowed for light use at all during the fledgling season. Furthermore, lighting has been removed altogether from the Waiʻoli Town Park (Basketball Court) after it was decided that the facility no longer needed to be available for nighttime use.

In addition to the cut-off retrofits, a new lighting control system has been installed for the facilities listed in Table 6. This system allows the County to completely control the lighting system and track its usage. County staff can schedule when the lights are available as well as review its actual usage. This means that the County can ensure that all of the lighting at these sites are turned off during the seabird fledgling season. For these sites, even if a user breaks into a control box at the park, they will not be able to turn the lights on during the seabird fledgling season.
Table 6. Facilities with Lighting Control Systems

<table>
<thead>
<tr>
<th>Facilities with Lighting Control Systems</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anahola Village Park (Basketball Court)</td>
<td>4</td>
</tr>
<tr>
<td>Bryan J. Baptiste Sports Complex (formerly known as Kapa‘a New Town Park)</td>
<td>4</td>
</tr>
<tr>
<td>(Softball, Tennis Court, Basketball Court, Hockey Rink)</td>
<td></td>
</tr>
<tr>
<td>Hanapēpē Stadium (Tennis Court)</td>
<td>5</td>
</tr>
<tr>
<td>Kalawai Park (Softball field, Tennis Court)</td>
<td>5</td>
</tr>
<tr>
<td>Kekaha Faye Park (Softball, Tennis Court, Basketball Court)</td>
<td>5</td>
</tr>
<tr>
<td>Kōloa Park Field (Softball, Tennis Court, Basketball Court)</td>
<td>5</td>
</tr>
<tr>
<td>Līhu'e County Park (Tennis Court)</td>
<td>4</td>
</tr>
<tr>
<td>Vidinha Stadium (Baseball Field)</td>
<td>5</td>
</tr>
<tr>
<td>Wailua Homestead Park (Tennis Court)</td>
<td>5</td>
</tr>
<tr>
<td>Wailua Houselots Park (Tennis Court)</td>
<td>4</td>
</tr>
<tr>
<td>Waimea Canyon Park (Softball, Basketball Court)</td>
<td>5</td>
</tr>
</tbody>
</table>

Facilities with outdoor lighting systems controlled strictly by staff and the controls are in a secure location (e.g., office, lock box, etc.) are listed in Table 7.

Table 7. Facilities with Secured Lighting Controls

<table>
<thead>
<tr>
<th>Facilities with Secured Lighting Controls</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bryan J. Baptiste Sports Complex (formerly known as Kapa‘a New Town Park)</td>
<td>5</td>
</tr>
<tr>
<td>(Stadium)</td>
<td></td>
</tr>
<tr>
<td>Hanapēpē Stadium (Stadium)</td>
<td>5</td>
</tr>
<tr>
<td>Kīlauea Park (Softball Field)</td>
<td>5</td>
</tr>
<tr>
<td>Peter Rayno Park (Softball Field)</td>
<td>5</td>
</tr>
<tr>
<td>Vidinha Stadium (Stadium)</td>
<td>5</td>
</tr>
</tbody>
</table>

With the exception of certain nights, the County has not and will not allow any of its Category 4 and 5 outdoor recreational facilities to have high-intensity lighting illuminated during the fledgling season.

During the non-fledging season, the County will:

- Have timers set to turn off lights after a specified amount of time (e.g., one hour) to avoid lights being on with no users. Users can continue use of lights by pressing a ‘restart’ button at the site;
- continue to shut off ALL high-intensity lighting at its outdoor recreation facilities no later than 10:00 PM; and
- limit use of lights at softball fields and stadiums to permitted users only.

Together, the retrofitted lighting and operational procedures at its facilities (including prohibitions on the use of high-intensity/unshielded lights at most locations during the fledgling season) will avoid and/or minimize the impact of the County’s facilities on the Covered Species.

As an implemented policy, the County now requires all of its new facilities to comply with KSHCP recommendations for full cut-off fixtures to minimize light pollution.
County parks staff typically check light timers at least twice a month as part of their overall maintenance responsibilities. When they find a timer that is malfunctioning, staff report the information to their supervisor. In turn, the supervisor works with other County Staff as appropriate to schedule repairs and/or replacement.

For all new construction and maintenance work where light fixtures are installed or replaced, the County will do its utmost to comply with KSHCP lighting recommendations for full cut-off fixtures. Only in those unusual circumstances (e.g., DUI checkpoints where motorists are subject to unannounced traffic stops, or emergency rescue and response), where the use of full cut-off fixtures would make it impossible to meet the operational requirements (e.g., where they would not provide sufficient illumination to meet safety codes or provide adequate safety or security), will the County consider the use of other types of lighting.

b. In addition to the many avoidance and minimization measures that are described above that the County has implemented concurrently with the development of the KSHCP, the County proposes to implement the following additional conservation measures:

1. For all County facilities listed in Categories 2 and 3, over time the County will replace all lighting so as to comply with KSHCP recommendations for full cut-off fixtures; this will be done as the existing fixtures reach the end of their useful lives. These retrofits will occur as part of the normal renovation and replacement of County facilities, or sooner where any specific problem of take might occur. All such replacements are anticipated to be completed within ten (10) years of issuance of an ITP/ITL the County is requesting. Finally, in addition to the physical changes, the County has altered its operations and the use of its facilities as much as it possibly can while prioritizing and ensuring the public’s safety. The County believes that this represents the maximum extent practicable for Category 2 and 3 facilities for the following reasons:

a. The lights and activities that are located at Category 2 facilities are of such a “de minimis” character (e.g., 60-, 75-, and 100-watt incandescent bulbs in fixtures mounted on the sides of buildings; 40-watt fluorescent tubes under cover of roofs; etc.) that they have no quantifiable potential for light attraction. In view of this, the County believes that ensuring that these fixtures are replaced with fully shielded fixtures at the end of their useful lives minimizes the potential for adverse effect to the maximum extent practicable.

b. Most of the lights at Category 3 facilities are of the same “de minimis” sort as those discussed above for Category 2 facilities. The County believes that for these lights upgrading at the end of their useful lives minimizes the potential for adverse effect to the maximum extent practicable. Certain lights at Category 3 facilities (e.g., 150-watt floodlights at police and fire stations) cast more light than the lower-wattage fixtures, and the County proposes to minimize the potential for adverse effect from these by: (i) turning these lights on only when needed to maintain safe and secure operations and (ii) using them only for the shortest reasonable length of time. That will be accomplished through the use of devices such as motion-sensors (which will keep lights off when there is no activity) and increased awareness training of County personnel.
2. For Category 4 facilities (i.e. playing areas for field sports such as baseball and soccer and for tennis and basketball courts), as indicated in Attachment A:
   a. The County will not illuminate Category 4 playing fields from September 15 through December 15 (i.e., during the fledging season), thereby eliminating all potential for light-related take at those facilities during this period.
   b. The County will not allow any Category 4 playing courts to be lit from September 15 through December 15, thereby eliminating all potential for light-related take at those facilities during this period.

3. As described in detail in the attachments to this application, for Category 5 facilities (particularly football stadiums) where night games currently occur during the fledgling season, the County will maintain the partially shielded fixtures that it installed following review and approval by the USFWS. Where nighttime events at stadiums that have shielded lighting are allowed, the County will monitor those events in accordance with the provisions outlined in the Memorandum of Understanding between the County and USFWS, effective September 13, 2018 (Attachment J). The results of the County’s monitoring of games during the 2017 and 2018 seabird fledgling season indicates that the modifications that it has made to the stadium lighting have greatly reduced the potential for light attraction. Because of this, the County will continue to allow night-time light use at some facilities; provided the selected nights avoid the peak fledgling migration period and are timed to the moon phase such that fallout is deemed low-risk; provided further that such use does not cause it to exceed the take that is authorized if this application is approved. If the real-time results of monitoring during any year indicate that it is likely to result in take in excess of the authorized amount for the then-current calendar year, the remaining night-time use dates will be rescheduled to a time and/or place where light attraction will not result.

4. In response to agency suggestions, the County has considered and carefully evaluated a County-wide or County facility-wide ordinance that would require the use of seabird-friendly lighting for all new development within the County. A number of considerations, however, make such a measure infeasible at this time. Therefore, the County Administration is not proposing such a measure as part of this application.

Proposing such a measure would not in any way ensure that it would become law since the Kaua‘i County Council would ultimately vote on any such measure. In addition, imposing such a requirement on the people of Kaua‘i differs from other commitments that are part of the County’s application in two fundamental ways:

- First, it would impose requirements on parties (such as individual home and business owners seeking building permits) other than the County itself.
- Second, it would burden the County with a costly enforcement role that it does not presently have.

Moreover, if the County were to impose such requirements on parties other than itself, it would constitute substantial “mitigation” that should offset unavoidable take by County-
owned facilities. In the absence of a mechanism by which the magnitude of that benefit could be fairly judged, it could not be adequately addressed in any decision related to the adequacy of the overall avoidance, minimization, and mitigation package.

Notwithstanding the foregoing, the County is investigating the possibility of adding advisory language to certain building and development permit forms that will inform applicants that all property owners must comply with federal and state endangered species requirements. The language could be modeled on the following language that is currently included in County Film Permit applications:

**IMPORTANT! The applicant acknowledges that the fledgling season for the endangered ‘U’au or Hawaiian Petrel and threatened ‘A’o or Newell’s Shearwater is from September 15 – December 15. The applicant acknowledges and understands that it is responsible to comply with the Endangered Species Act of 1973 (7 U.S.C. sect. 136, 16 U.S.C. sect. 1531 et seq.) and Hawai’i Revised Statutes Chapter 195D for any activities that could cause any take of endangered or threatened species, including the installation and use of any lights while filming during the fledgling season at any property. To minimize adverse impacts on listed endangered and threatened species, the applicant shall use only the following types of external lights: shielded lights, cut-off luminaries, or indirect lighting, all preferably having a 90-degree cut-off. Spotlights aimed upward or spotlighting of structures, landscaping, or the ocean shall be prohibited. Applicants should contact the United States Fish and Wildlife Service to obtain an Incidental Take Permit (ITP) and/or the Department of Land and Natural Resources, Division of Forestry and Wildlife to obtain an Incidental Take License (ITL) for any activities that could cause take of threatened or endangered species.

The applicant agrees and understands that it shall defend, indemnify, and hold harmless the County of Kaua‘i, its officers, agents, assigns, and employees from and against any and all claims arising directly or indirectly out of the applicant’s activities that affects any endangered or threatened species, including the use of lights during the fledgling season.

**c. Measures which the County will take in order to avoid or minimize the impact of future facilities include:**

1. Continue to install and use seabird-friendly lighting at all new County facilities.
2. Promote seabird-friendly practices by County employees and users of County facilities through education and training.
Item 8. Minimization Plans. Provide a plan to minimize the effects to the Covered Seabirds due to the Covered Activities. KSHCP Participants will be required to minimize the effects of the Covered Activities to the “maximum extent practicable” per applicable state and federal laws which regulate take license/permit issuance. The KSHCP document provides minimization objectives and measures to follow.

The Minimization Plans should include the proposed minimization measures, an estimated completion schedule, and estimated cost for each facility. In this item, the Participant can include measures already completed or in place (new lights, shields, operational changes).

For minimization measures not yet determined but anticipated to occur at the facility, this section should include an estimated cost that will be earmarked to future minimization measures and a process to determine how and when those measures will be evaluated, selected, and decided (such as a cost-benefit analysis).

If applicable, the participant must provide the reasoning why certain measures will not be implemented. The suggested table below may each be altered to best describe the Minimization Plan. Attach additional pages, photos, and drawings as needed.

With the exception of the Waimea Tennis Court due to budget constraints, all of the Category 4 and 5 facilities have already been retrofitted with shielded lighting. Furthermore, a new light control system has been installed and implemented at most of the Category 4 and 5 facilities. In addition, the County has already implemented procedures to minimize use of all of its lights at all of its facilities. Please see Attachments A-F for details on the County’s minimization measures. In addition, all minimization measures described in Items 7 and 8 will be applied to any new facilities constructed, acquired, and operated by the County during the term of the take authorization.

Item 9. Take Monitoring Plan. Provide a plan to monitor take of the Covered Species at the facilities proposed to be covered by the incidental take permit/license. The take monitoring plan describes how the property will be searched for downed Covered Seabirds. The KSHCP document provides standards and guidelines for take monitoring to ensure that take of the species is accurately measured and recorded.

The KSHCP document provides two options for accomplishing monitoring of take at facilities covered under an incidental take permit/license issued to a landowner:
Option 1: “Self-monitoring.” Participants arrange for monitoring of take at their facilities and fund the DLNR to conduct calibration of the monitoring. Self-monitoring can be accomplished with “in-house” staff trained as searchers, or other means such as contracting for the service; or

Option 2: Participants fund the DLNR to conduct compliance monitoring of take at their facilities (requires consultation with DLNR-DOFAW).

The KSHCP document provides details including terms and conditions that apply to these two options. For large-scale facilities, Participants should consult with the USFWS and the DLNR for monitoring methods that are scale-appropriate to the size and scale of the facility.

The regulatory agencies will make the final determination as to the adequacy of the take monitoring plan.

<table>
<thead>
<tr>
<th>KSHCP Options for Monitoring of Take</th>
<th>Check box (leave unchecked if not sure)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option 1. “Self-monitoring” of take.</td>
<td>☒</td>
</tr>
<tr>
<td>Option 2. The DLNR conducts monitoring of take (requires Participant funding &amp; DLNR consultation).</td>
<td>☐</td>
</tr>
</tbody>
</table>

Since fulfilling the terms and conditions of probation, the County has continued to monitor its facilities by searching and reporting any grounded or downed seabirds (there have been none) at its facilities lighted with retrofitted lights. For example, during the fledgling season, Fire Department personnel walk a 10-foot perimeter around the fire stations to locate, record, and report any downed seabirds at the beginning of their shifts at around 7:00am. The facility maintenance personnel with the Department of Public Works (now with the Department of Parks and Recreation) also conduct a search of the Līhuʻe Civic Center at the beginning of their shifts. In addition, during the 2017 and 2018 KIF football seasons when night games were held, the County coordinated with the State of Hawaiʻi Department of Education, the Kauaʻi Endangered Seabird Recovery Program (KESRP), the State of Hawaiʻi Department of Land and Natural Resources (DLNR), and the USFWS to monitor, record, and report any circling or downed seabirds.

Aside from the incidental observations that designated personnel would make as they carry out their regular duties, the County does not anticipate undertaking any monitoring of facilities in Categories 1 and 2.

County staff will continue to ensure that there are no unintended changes in facilities or operating procedures that would compromise their qualification for that category. For example, staff will periodically check the facilities to ensure that there has been no damage that has compromised light shielding, removed controls designed to limit light use, etc.

As described earlier in this PIP, the County has categorized its facilities primarily by the types of lighting and uses present at each of its facilities. These categories are shown in Table 1, above, and are listed in alphabetical order and by category in Attachment A. In Attachment I the County has chosen a facility for each category as representative of that category and, using that representative...
facility, has illustrated the monitoring plan that the County will employ for each category. While the search route will vary slightly, the frequency, personnel, time required, dates, problem areas, and data to be collected are consistent by category.

The County’s monitoring plans for Category 5 facilities call for monitoring similar to that conducted at select facilities in 2018. Specifically, whenever lights are on at night at any County-operated Category 5 facility between September 15 and December 15, the County will coordinate with the KSHCP staff to ensure that the facility grounds are monitored by an appropriately sized group of persons trained by KSHCP staff or other agency-designated personnel. The monitoring will include: documentation of the number, species, timing, height and flight patterns of observed seabirds; the number and species of seabirds that appear to have been grounded or downed, as well as seabirds that appeared to be headed for grounding but were not found; and information on the condition of any recovered grounded or downed seabirds. In addition, before turning off the lights immediately following the nighttime use of facilities, the facility grounds will be searched for any grounded or downed Covered Species.

The County will maintain detailed records of the monitoring results which will be provided to the agencies in its annual report in accordance with the terms of the ITP/ITL and KSHCP. The data will include the location, times, dates, and personnel (including volunteers utilized) involved in the monitoring; and the location, condition, identification, in situ photographs, and fate of each recovered Covered Species. Any grounded Covered Species encountered during such monitoring will be reported to the USFWS and DOFAW, and all retrieved Covered Species will be transferred to the Save Our Shearwater ("SOS") program in conformance with recommendations of that program.
### Table 8. Monitoring Plan

<table>
<thead>
<tr>
<th></th>
<th>Confirmed Unlit Facilities</th>
<th>Unlit facilities</th>
<th>None</th>
<th>None</th>
<th>None</th>
<th>None</th>
<th>None</th>
<th>New-hire orientation training</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>Facilities with minimal structural and/or parking lighting and/or lights are used infrequently. This includes such things as neighborhood centers, base yards, and some beach parks. Some of the facilities in this category have lights that are under eaves or in other situations which prevent the light from shining directly outward. In general, none of the lamps present exceed 100 watts.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Minimal Lighting</td>
<td>17</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>New-hire orientation training</td>
</tr>
<tr>
<td></td>
<td>Facilities with low levels (in lumens or on-time) of external building lighting or lit parking areas. In general, these facilities have a sufficient number of external lights to prevent their inclusion in Category 2, but whose lights can be managed and/or readily retrofitted so as to limit the release of stray light to insignificant levels and/or very short periods of time during sensitive periods.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Limited External Lighting</td>
<td>37</td>
<td>If report is received, daily</td>
<td>Only if report is received, weekly</td>
<td>An area up to 10’ around the area where downing is reported</td>
<td>A.M. prior to the start of employees shifts.</td>
<td>1</td>
<td>New-hire orientation and annual training</td>
</tr>
<tr>
<td></td>
<td>Facilities with multiple high intensity lights and with significant area coverage. This category includes court lights (e.g., basketball courts, tennis courts, skateboard parks, volleyball courts, etc.) or significant external lighting such as parking or recreational areas (e.g. Kaua’i War Memorial Convention Center).</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Substantial Exterior Area &amp; Court Lighting</td>
<td>11</td>
<td>If report is received, daily</td>
<td>Only if report is received, weekly</td>
<td>The entire site.</td>
<td>A.M. prior to the start of employees shifts.</td>
<td>1 or 2</td>
<td>New-hire orientation and annual training</td>
</tr>
<tr>
<td></td>
<td>Facilities which have numerous, frequently used, high-intensity light fixtures and whose use cannot be limited to non-seabird seasons. This category includes facilities that have field and stadium lights on high poles which by their nature are difficult to minimize.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Stadium &amp; Field Lighting</td>
<td>12</td>
<td>If in use, then when in use: daily</td>
<td>If in use, then weekly.</td>
<td>The entire site.</td>
<td>A.M. prior to the start of employees shifts. When in use during the fledgling season, the facility grounds will be searched immediately after lights are turned off.</td>
<td>1 or 2; during the fledgling season, up to 4</td>
<td>New-hire orientation and annual training</td>
</tr>
</tbody>
</table>

Note 1: Tabulation was taken as of October 31, 2018. The number of facilities, and possibly the categorization of individual facilities, will change over time as the County removes old facilities, adds new ones, and replaces older lighting fixtures.

Note 2: See Attachment A for facilities listing by category; Attachment C for illustrations of category 2 and 3 lighting; Attachment D for illustrations of category 4 lighting; and Attachment E and F for illustrations of category 5 lighting.
Item 10. Components of the Green Sea Turtle Minimization and Monitoring Plan (if required). Monitoring and minimization for the Green Sea Turtle is in two parts: A) Monitoring to detect nests and B) Monitoring and minimizing impacts to nests detected.

For reasons discussed in Item 3 above, available data suggest that County facilities will not adversely affect Green Sea Turtles and the County has not, therefore, prepared a Green Sea Turtle (Honu) Minimization and Monitoring Plan.

Part A: Monitoring to detect Green Sea Turtle Nests
Please provide the following information; the table below may be used and altered as needed.

1) Detailed location and description of beaches, including linear distance, at which searching for nests of the green sea turtle will take place. Searches should take place at any beach from which light at the facility can be viewed;

2) Monitoring protocols indicating:
   a) Annual training of searchers;
   b) Frequency of searches (every other day or as much as possible);
   c) Conduct active searching (searching the beach width);
   d) Sufficient number of trained searchers to cover the area; and
   e) Record results of search monitoring.

3) All Participants conducting self-monitoring are required to record the results of search efforts. Records should provide:
   a) Evidence (what was seen). Include description and provide photographs
   b) Location on the beach (GPS) and physically mark the location if possible
   c) Date and time of day
   d) Description of surrounding land use (e.g., vacant, or developed), and
   e) Proximity to the facility.

Part B: Monitoring of Identified Green Sea Turtle Nests
Each identified nest of the green sea turtle should be monitored and protected from light attraction. Please provide the following monitoring protocols; the tables below may be used and altered as needed.

1. Light avoidance measure for identified nests (either shield/deactivate lights at the facility or install and maintain a light shield around each identified nest);
2. Frequency of searches. Searches should take place every 1-2 days. Incubation takes approximately 45 days at which time monitoring should increase in frequency (e.g. daily);
3. Number of searches monitoring the nests. The number of needed to monitor active nests will depend on number of nests identified and amount of beach needed to be covered;
4. Record the results of nest monitoring. Monitoring should provide:
   a. Evidence of hatchling emergence (description and photos):
   b. Date and time of emergence,
   c. Direction of tracks
   d. Condition of the nest area (e.g., disturbed or not).
**Green Sea Turtle Take Monitoring Protocols – Part A: Monitoring to Detect Nests**

Please provide search protocols for detecting nests of the green sea turtle (Attach pages as needed)

<table>
<thead>
<tr>
<th>Item</th>
<th>Protocol (fill in protocol &amp; provide reasons)</th>
<th>KSHCP Guideline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location &amp; description of the beach, or beaches, surveyed and the linear distance of the beach.</td>
<td></td>
<td>Beach area surveyed should coincide with visibility from the facility with the lights.</td>
</tr>
<tr>
<td>Frequency of searches (# per day or per week)</td>
<td></td>
<td>Every other day during nesting season (typ. May 15 to end of August)</td>
</tr>
<tr>
<td>Number of searchers per search area</td>
<td></td>
<td>Depends on site conditions and safety considerations</td>
</tr>
<tr>
<td>Proposed training</td>
<td></td>
<td>Searchers should receive annual training conducted by the DLNR or the USFWS, or their designee. See item 9a.</td>
</tr>
</tbody>
</table>

**Green Sea Turtle Take Monitoring Protocols – Part B: Monitoring of Identified Nests & Minimization**

Please provide search protocols to monitor identified nests (from Part A) of the green sea turtle (Attach pages as needed)

<table>
<thead>
<tr>
<th>Item</th>
<th>Protocol (fill in protocol &amp; provide reasons)</th>
<th>KSHCP Guideline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency of searches (# per day or per week)</td>
<td></td>
<td>Active nests should be monitored every 1-2 days; then daily during expected hatching date</td>
</tr>
<tr>
<td>Light avoidance</td>
<td></td>
<td>If lights cannot be deactivated or shielded from the nest, each nest should be screened from visible light.</td>
</tr>
<tr>
<td>Number of searchers per search area</td>
<td></td>
<td>Depends on site conditions and safety considerations</td>
</tr>
</tbody>
</table>
Item 11. Training. Describe the schedule that will be followed to provide training for staff. Training must be provided to those that will conduct and oversee the searches at the facility.

The “self-monitoring” training should include:

1. Summary of regulations protecting the Covered Species;
2. Search procedures, route, frequency and timing specific to the facility’s monitoring plan, for seabirds and green sea turtle nests;
3. Response procedures including safe and proper techniques for handling seabirds;
4. Recognizing evidence of green sea turtle nests (if lights shine on a beach), proper nest light screening, and hatching activity (e.g., emergence);
5. Procedures to document the results of searches;
6. Downed wildlife agency contacts; and
7. Nearest SOS aid station.

Rescuing Downed Seabirds—Standard Operating Procedures (SOP)

The following steps provide the procedure for recovering downed seabirds found:

1. Take the seabird recovery kit and pet carrier to the downed seabird.
2. Put on gloves.
3. Using towel to gently cover the bird, pick up the seabird.
4. Place the seabird in the pet carrier, and close the pet carrier.
5. Put the gloves and towel back in the seabird rescue kit.
6. Take the bird and pet carrier to an SOS Aid Station.
7. Transfer the bird to the Aid Station’s pet carrier.
8. Call SOS at 632-0610 or 635-5117.
9. Return the seabird rescue kit and pet carrier.
11. Give the completed “Bird Take Field Report” to the General Manager, or other responsible staff person at the facility.

Contents of Seabird Recovery Kit

1. Latex or nitrile gloves;
2. Three towels;
3. Hand sanitizer;
4. Flashlight or headlamp;
5. Clipboard, pen and blank “Bird Take Field Reports”, or similar; and
6. Pet carrier –medium sized. If a box is used it must be well ventilated and marked conspicuously “LIVE ANIMAL”.
During probation, the County was required to train its officers and employees. That training was recorded and is accessible to all County personnel on demand on the County intranet. Upon issuance of an ITL/ITP, all new County personnel will be required to watch the recorded training via the County on-boarding website and will be required to provide an acknowledgment of completion of the training during new-hire orientation. In addition, all new hires will be provided the Monitoring Policy and Procedure (Attachment I) during the new-hire orientation.

Upon issuance of an ITL/ITP, all County personnel that are required to perform self-monitoring tasks, will receive annual training in August. This will incorporate the volunteer monitor training presentation that the County provides pursuant to protocols established by USFWS as indicated in Attachment J. The County may incorporate or replace the current training with the detailed slide show proposed to be created by the Prime Contractor under the KSHCP and/or Appendix F of the KSHCP. The current training includes general information on the KSHCP, Covered Species biology and identification, cultural and ecological importance of the Covered Species, light attraction and harm, federal and state laws, County efforts, rescue procedures, and the SOS program.

**Item 12. Describe any outreach conducted (e.g., handing out pamphlets on seabird awareness to facility employees or guests, etc.):**

The County will provide educational flyers to all organizations that use Category 3, 4, and 5 facilities. The flyers will inform the users of the possible presence of Covered Species, the impacts of the use of lights during the fledgling season, and what to do should the users see seabirds being impacted by the lights. In addition, the County will post signage at all lighted softball fields, basketball courts, and tennis courts, where users are able to manually turn on the lights. The signage will be installed immediately adjacent to the light switches and controllers. The signage will be based on the notices that the County already posts at all lighted facilities during the fledgling season. Please see Attachment G for the sample flyers. The County posted the following notice on its Parks and Recreation website, which lists all County facilities, informing the public of the time of year and reason for prohibiting the use of lights at night at County facilities.

**Figure 2. Department of Parks and Recreation Website Notice**

![Image of Department of Parks and Recreation Website Notice]

Source: [https://www.kauai.gov/Government/Departments-Agencies/Parks-Recreation/Facilities](https://www.kauai.gov/Government/Departments-Agencies/Parks-Recreation/Facilities)

In addition to the above, the County has brought up the possibility of implementing an outreach program for credit that would be applicable to off-set the County’s non-lethal take costs. Outreach activities for credit could include the following:

- Conducting a signage contest for all school age keiki throughout the County in which participants are challenged to create artwork for a particular County facility so that each County facility will have a facility specific artwork (sign) and the artwork entries would be judged on i) depiction of...
one of the Covered Species, ii) illustration of the impact of the Covered Activity on the Covered Species, iii) use of Hawaiian language or culture and/or history of the facility location, iv) use of endemic or native flora and fauna other than the Covered Species representative of the facility location, v) incorporation of the specific County facility in the artwork;

- conducting county-wide training on the cultural, biological, and historical importance of the covered species;
- appearing as the “Sherman the Shearwater” mascot at parades and events (e.g. the Farm Fair);
- coordinating an endangered/threatened species law and government case study program with Kaua‘i schools and organizations like Leadership Kaua‘i (studying legal cases, how a bill becomes a law at the congressional level, and how the executive branch makes decisions based on those types of laws etc.);
- initiating a free rat-trap program with an accompanying educational video briefing; and
- appearing on local television programs (e.g. Walaʻau or Hiki Nō).

These activities would be to offset the non-lethal take cost.

From 2009 through the present, the County has conducted a number of outreach activities. They include:

- conducting a county-wide training on the cultural, biological, and historical importance of the covered species to over a thousand (1,000) county employees;
- television appearances on the Mayor’s Show, County Council, Hiki Nō, and Walaʻau where we discussed the cultural, biological, and historical importance of the covered species; featuring our “Sherman Saves Christmas” performance at our county-wide Holly Jolly Competition;
- presenting the training on the cultural, biological, and historical importance of the covered species to Kapa‘a High School teachers and students;
- presenting the training on the cultural, biological, and historical importance of the covered species to Kaua‘i High School teachers and coaches; and
- conducting an endangered/threatened species law and government case study class for the Waimea High School ROTC Program and Close Up class, and Leadership Kaua‘i.
Part 2. Take Estimate, Requested Take Authorization, & Funding

Item 1. Show the calculation of estimated take for each of the Covered Species.

Following the take estimation methods in the KSHCP for estimating a Participant’s take (Section 6.2.2), the tables below show the take estimate calculation for the facility(s) for each of the Covered Seabirds.

The KSHCP take estimate method utilizes the average of the most recent 5 years of SOS recovery data for the facility, and/or results of KSHCP monitoring data if available. Applied to the data is an adjustment for downed birds not found, based on a 50% discovery rate and an adjustment based on SOS mortality (birds dead on arrival or those that die in care) – average SOS mortality is 12%.

If the landowner-applicant submits a take estimate with an alternate discovery rate, they must provide the reasons why an alternate rate was used to estimate take, including relevant information supporting their reasoning (% of searchable area, search protocols that will be used, any searcher efficiency trials that have been or will be conducted at facilities and/or demonstration of quick, effective recovery of birds). Please include narrative and/or photos and maps to support this.

Responses to Item 1 and Item 2 are addressed together in Item 2.

Item 2. Select the requested take authorization and permit/license term coverage for each of the Covered Species.

Estimated Take for Newell’s Shearwaters (NESH or ‘A’o)

The County is accepting the estimate for NESH direct fallout by existing facilities and operations which were provided to it by KSHCP staff in June 2016 and anticipates that level of take will continue at non-stadium facilities. This includes 4.2 birds per year found at the facilities themselves and the same number of birds that are attracted but are never found (i.e., a “discovery rate” of 50%).

The County is also requesting take coverage for potential take related to night-time use of some Category 5 facilities, as previously mentioned in Part 1, Item 7 above. While there has been no take in 2017 and 2018, conservatively, the County estimates that such use could result in 5.36 lethal and 2.64 non-lethal takes each year during the term of the permit.

Estimated Average Annual Take for Hawaiian Petrel (HAPE or ‘Ua’u)

The County also accepts KSHCP staff’s estimate that take of Hawaiian Petrel will average 0.63 birds per year. Of these, the County estimates that 0.5 will be lethal and 0.13 will be non-lethal.

Estimated Average Annual Take for Band-Rumped Storm Petrel (‘Ake‘ake)

SOS and other data suggest that it is very unlikely that County facilities will be responsible for the take of any Band-Rumped Storm Petrel. However, as such a possibility cannot be completely discounted, the County requests coverage for an average annual take of 0.1 birds per year.

30-Year Estimated Take
Based on the estimated annual take numbers given above for each of the three species, the County is requesting 30-year take authorization totals summarized in Table 9 below.

**Table 9. Requested Annual Take Authorization**

<table>
<thead>
<tr>
<th>Annual average number of downed NESH (5 most recent yrs), HAPE or BRSP (15 most recent years)</th>
<th>Newell’s Shearwater</th>
<th>Hawaiian Petrel</th>
<th>Band-rumped Storm Petrel</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.2</td>
<td>0.5</td>
<td>0.1</td>
<td></td>
</tr>
</tbody>
</table>

| Annual observed lethal take estimate (12% of 1, all downed birds) | 0.0504 | 0.06 | 0.012 |

| Annual unobserved lethal take estimate (e.g. 100% of 1, all downed birds if 50% searcher efficiency assumed) | 4.2 | 0.5 | 0.1 |

| Total estimated annual lethal take from light attraction | 4.704 | 0.506 | 0.112 |

| Total Requested Annual Lethal Take | 12.704 | 0.506 | 0.112 |

| Estimated 30 Year Seabird Take | 381.12 | 16.8 | 3.36 |

**Item 3. Funding Assurance.** Provide proof of adequate funding (see KSHCP document). All participants must demonstrate requisite funding prior to permit/license approval to ensure that the proposed measures and actions, including monitoring, will be undertaken in accordance with the terms and schedule of the KSHCP.

The County guarantees adequate funding for this permit for the first year. For the remaining term of the permit, the County commits only to including funding for the HCP permit as a line item in the proposed County budget. The County will certify in its Annual Report that it will request in its annual budget and, if appropriated and allocated, expend the operating funds necessary to continue its obligations throughout the term of its ITP and ITL. The County will promptly notify the Prime Contractor and regulatory agencies if the funds requested are not appropriated and allocated. Please note that all commitments expressed in this application are subject to Kaua‘i County Council approval.
Signature of Participant: ________________________________

Printed Name: Patrick Porter

Date: ________________

The undersigned affirms that all the information included is true and accurate to the best of the participant’s knowledge and that this PIP is voluntarily submitted. □ check to waive confidentiality
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Attachment B  Illustrates the location and characteristics of lighting at County facilities
Attachment C  Illustrates Category 3 lighting
Attachment D  Illustrates Category 4 lighting
Attachments E and F  Illustrates Category 5 lighting
Attachment G  Sample fliers
Attachment H  Portable Floodlight Policy
Attachment I  Monitoring Policy and Procedure
Attachment J  Night-time Category 5 events protocol
Stop Lat.

Stop Lon.

Light Type

Assigned
Category

No. of
Lamps

Regular
Usage

Frequency of
Night Usage

Duration of Night Usage

Legal Requirement for Lighting

Notes

Proposed Minimization Measure

A/C ANAHOLA POST OFFICE BUS STOP

22.144802

-159.315134

LED

2

1

Yes

Daily

Dusk till Dawn

Liability, Safety & Security

Photo-sensor

Already Fully Minimized

A/C FISH EXPRESS BUS STOP

21.984315

-159.366730

LED

2

1

Yes

Daily

Dusk till Dawn

Liability, Safety & Security

Photo-sensor

Already Fully Minimized

A/C GARDEN ISLAND INN BUS STOP

21.959135

-159.353530

LED

2

1

Yes

Daily

Dusk till Dawn

Liability, Safety & Security

Photo-sensor

Already Fully Minimized

A/C KAPAHI FOOD MART BUS STOP

22.098746

-159.333962

LED

2

1

Yes

Daily

Dusk till Dawn

Liability, Safety & Security

Photo-sensor

Already Fully Minimized

A/C KILAUEA FOOD MART BUS STOP

22.207063

-159.411902

LED

2

1

Yes

Daily

Dusk till Dawn

Liability, Safety & Security

Photo-sensor

Already Fully Minimized

A/C KUKUIHALE RD BUS STOP

22.137867

-159.305339

LED

2

1

Yes

Daily

Dusk till Dawn

Liability, Safety & Security

Photo-sensor

Already Fully Minimized

A/C LAWAI POST OFFICE BUS STOP

21.923095

-159.500927

LED

2

1

Yes

Daily

Dusk till Dawn

Liability, Safety & Security

Photo-sensor

Already Fully Minimized

A/C MAHELONA HOSPITAL BUS STOP

22.087896

-159.314204

LED

2

1

Yes

Daily

Dusk till Dawn

Liability, Safety & Security

Photo-sensor

Already Fully Minimized

ANAHOLA POST OFFICE BUS STOP

22.144430

-159.314854

LED

2

1

Yes

Daily

Dusk till Dawn

Liability, Safety & Security

Photo-sensor

Already Fully Minimized

BRYDESWOOD BUS STOP

21.923630

-159.535684

LED

2

1

Yes

Daily

Dusk till Dawn

Liability, Safety & Security

Photo-sensor

Already Fully Minimized

EIWA STREET BUS STOP

21.975985

-159.367620

LED

2

1

Yes

Daily

Dusk till Dawn

Liability, Safety & Security

Photo-sensor

Already Fully Minimized

ELEELE NANI BUS STOP

21.908371

-159.579651

LED

2

1

Yes

Daily

Dusk till Dawn

Liability, Safety & Security

Photo-sensor

Already Fully Minimized

ELEPAIO RD/IWA RD-100 BUS STOP

21.965943

-159.711295

LED

2

1

Yes

Daily

Dusk till Dawn

Liability, Safety & Security

Photo-sensor

Already Fully Minimized

ELEPAIO RD/PUEO RD BUS STOP

21.963150

-159.707044

LED

2

1

Yes

Daily

Dusk till Dawn

Liability, Safety & Security

Photo-sensor

Already Fully Minimized

ELEPAIO/AKIALOA 100 BUS STOP

21.973379

-159.721669

LED

2

1

Yes

Daily

Dusk till Dawn

Liability, Safety & Security

Photo-sensor

Already Fully Minimized

ELEPAIO/IO RD 100 BUS STOP

21.968251

-159.714675

LED

2

1

Yes

Daily

Dusk till Dawn

Liability, Safety & Security

Photo-sensor

Already Fully Minimized

GARDEN ISLAND INN BUS STOP

21.958856

-159.353736

LED

2

1

Yes

Daily

Dusk till Dawn

Liability, Safety & Security

Photo-sensor

Already Fully Minimized

HANAPEPE 1ST UNITED CHURCH BUS STOP

21.909179

-159.588288

LED

2

1

Yes

Daily

Dusk till Dawn

Liability, Safety & Security

Photo-sensor

Already Fully Minimized

HANAPEPE ARMORY BUS STOP

21.908012

-159.594447

LED

2

1

Yes

Daily

Dusk till Dawn

Liability, Safety & Security

Photo-sensor

Already Fully Minimized

HOKULEI VILLAGE-KAUMUALII HWY BUS STOP

21.970182

-159.385905

LED

2

1

Yes

Daily

Dusk till Dawn

Liability, Safety & Security

Photo-sensor

Already Fully Minimized

HOKULEI VILLAGE-NUHOU RD BUS STOP

21.968705

-159.387906

LED

2

1

Yes

Daily

Dusk till Dawn

Liability, Safety & Security

Photo-sensor

Already Fully Minimized

ISHIHARA MARKET BUS STOP

21.954368

-159.666603

LED

2

1

Yes

Daily

Dusk till Dawn

Liability, Safety & Security

Photo-sensor

Already Fully Minimized

KALAHEO NC BUS STOP

21.924895

-159.527261

LED

2

1

Yes

Daily

Dusk till Dawn

Liability, Safety & Security

Photo-sensor

Already Fully Minimized

KALEPA VILLAGE BUS STOP

21.995901

-159.352767

LED

2

1

Yes

Daily

Dusk till Dawn

Liability, Safety & Security

Photo-sensor

Already Fully Minimized

KAPAA HONGWANJI BUS STOP

22.070617

-159.319442

LED

2

1

Yes

Daily

Dusk till Dawn

Liability, Safety & Security

Photo-sensor

Already Fully Minimized

KAPAA NC BUS STOP

22.079914

-159.314210

LED

2

1

Yes

Daily

Dusk till Dawn

Liability, Safety & Security

Photo-sensor

Already Fully Minimized

KAUMUALII HWY-A/C KCC BUS STOP

21.967286

-159.394800

LED

2

1

Yes

Daily

Dusk till Dawn

Liability, Safety & Security

Photo-sensor

Already Fully Minimized

KAUMUALII HWY-KCC BUS STOP

21.967670

-159.394486

LED

2

1

Yes

Daily

Dusk till Dawn

Liability, Safety & Security

Photo-sensor

Already Fully Minimized

KAWAIHAU RD/KAHANA RD BUS STOP

22.095799

-159.327202

LED

2

1

Yes

Daily

Dusk till Dawn

Liability, Safety & Security

Photo-sensor

Already Fully Minimized

KAWAIHAU RD/MALAKIA RD BUS STOP

22.094408

-159.321490

LED

2

1

Yes

Daily

Dusk till Dawn

Liability, Safety & Security

Photo-sensor

Already Fully Minimized

KEKAHA NC BUS STOP

21.970078

-159.717569

LED

2

1

Yes

Daily

Dusk till Dawn

Liability, Safety & Security

Photo-sensor

Already Fully Minimized

KILAUEA FOOD MART BUS STOP

22.207325

-159.411795

LED

2

1

Yes

Daily

Dusk till Dawn

Liability, Safety & Security

Photo-sensor

Already Fully Minimized

KOLOA RD/HORITA RD BUS STOP

21.918092

-159.498174

LED

2

1

Yes

Daily

Dusk till Dawn

Liability, Safety & Security

Photo-sensor

Already Fully Minimized

KUHIO MEDICAL CENTER BUS STOP

21.982619

-159.367291

LED

2

1

Yes

Daily

Dusk till Dawn

Liability, Safety & Security

Photo-sensor

Already Fully Minimized

KUKUIHALE RD-500 BUS STOP

22.138002

-159.305229

LED

2

1

Yes

Daily

Dusk till Dawn

Liability, Safety & Security

Photo-sensor

Already Fully Minimized

LAUKONA RD 400 BUS STOP

21.993616

-159.356917

LED

2

1

Yes

Daily

Dusk till Dawn

Liability, Safety & Security

Photo-sensor

Already Fully Minimized

LAUKONA RD-500 BUS STOP

21.993393

-159.357269

LED

2

1

Yes

Daily

Dusk till Dawn

Liability, Safety & Security

Photo-sensor

Already Fully Minimized

LAWAI POST OFFICE BUS STOP

21.923205

-159.501274

LED

2

1

Yes

Daily

Dusk till Dawn

Liability, Safety & Security

Photo-sensor

Already Fully Minimized

MARIKO STORE BUS STOP

21.908000

-159.595096

LED

2

1

Yes

Daily

Dusk till Dawn

Liability, Safety & Security

Photo-sensor

Already Fully Minimized

PETER RAYNO PARK BUS STOP

21.995761

-159.352763

LED

2

1

Yes

Daily

Dusk till Dawn

Liability, Safety & Security

Photo-sensor

Already Fully Minimized

PONO KAI BUS STOP

22.073597

-159.319132

LED

2

1

Yes

Daily

Dusk till Dawn

Liability, Safety & Security

Photo-sensor

Already Fully Minimized

WAILUA HOMESTEADS PARK BUS STOP

22.057400

-159.369016

LED

2

1

Yes

Daily

Dusk till Dawn

Liability, Safety & Security

Photo-sensor

Already Fully Minimized

WAIMEA 1ST HAWAIIAN BANK BUS STOP

21.954450

-159.666585

LED

2

1

Yes

Daily

Dusk till Dawn

Liability, Safety & Security

Photo-sensor

Already Fully Minimized

WAIPOULI COURTYARDS BUS STOP

22.053065

-159.332470

LED

2

1

Yes

Daily

Dusk till Dawn

Liability, Safety & Security

Photo-sensor

Already Fully Minimized

WESTSIDE PHARMACY BUS STOP

21.909299

-159.587642

LED

2

1

Yes

Daily

Dusk till Dawn

Liability, Safety & Security

Photo-sensor

Already Fully Minimized

A/C PRINCEVILLE LIBRARY BUS STOP

22.21311

-159.47345

LED

2

1

Yes

Daily

Dusk till Dawn

Liability, Safety & Security

Photo-sensor

Already Fully Minimized

COURTYARDS AT WAIPOULI BUS STOP

22.0531

-159.33243

LED

2

1

Yes

Daily

Dusk till Dawn

Liability, Safety & Security

Photo-sensor

Already Fully Minimized

PRINCEVILLE SHOPPING CENTER BUS STOP

22.21312

-159.47407

LED

2

1

Yes

Daily

Dusk till Dawn

Liability, Safety & Security

Photo-sensor

Already Fully Minimized

KAPAHI PARK BUS STOP

22.0998

-159.34708

LED

2

1

Yes

Daily

Dusk till Dawn

Liability, Safety & Security

Photo-sensor

Already Fully Minimized

WAIPOULI BEACH RESORT BUS STOP

22.061987

-159.320205

LED

2

1

Yes

Daily

Dusk till Dawn

Liability, Safety & Security

Photo-sensor

Already Fully Minimized

KAPAA LIBRARY BUS STOP

22.0777766

-159.316181

LED

2

1

Yes

Daily

Dusk till Dawn

Liability, Safety & Security

Photo-sensor

Already Fully Minimized

KEALIA BEACH BUS STOP

22.098658

-159.305478

LED

2

1

Yes

Daily

Dusk till Dawn

Liability, Safety & Security

Photo-sensor

Already Fully Minimized

A/C KEALIA BEACH BUS STOP

22.09814

-159.30587

LED

2

1

Yes

Daily

Dusk till Dawn

Liability, Safety & Security

Photo-sensor

Already Fully Minimized

KAPAA SKATE PARK BUS STOP

22.076975

-159.321851

LED

2

1

Yes

Daily

Dusk till Dawn

Liability, Safety & Security

Photo-sensor

Already Fully Minimized

Stop Name

KSHCP-PIP

County of Kauai

Attachment A

1


<table>
<thead>
<tr>
<th>Bus Stop Name</th>
<th>Latitude</th>
<th>Longitude</th>
<th>Light Type</th>
<th>Lane</th>
<th>Beep</th>
<th>Daily</th>
<th>Time Range</th>
<th>Liability, Safety &amp; Security</th>
<th>Photo-sensor</th>
<th>Minimization Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>REALALA SUBDIVISION BUS STOP</td>
<td>21.903064</td>
<td>-159.586039</td>
<td>LED</td>
<td>2</td>
<td>1</td>
<td>Yes</td>
<td>Daily</td>
<td>Dusk till Dawn</td>
<td>Liability, Safety &amp; Security</td>
<td>Photo-sensor</td>
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<tr>
<td>KAPAAI FORD MART BUS STOP</td>
<td>22.098676</td>
<td>-159.333942</td>
<td>LED</td>
<td>2</td>
<td>1</td>
<td>Yes</td>
<td>Daily</td>
<td>Dusk till Dawn</td>
<td>Liability, Safety &amp; Security</td>
<td>Photo-sensor</td>
</tr>
<tr>
<td>WAIMEA ATHLETIC FIELD BUS STOP</td>
<td>21.958927</td>
<td>-159.674159</td>
<td>LED</td>
<td>2</td>
<td>1</td>
<td>Yes</td>
<td>Daily</td>
<td>Dusk till Dawn</td>
<td>Liability, Safety &amp; Security</td>
<td>Photo-sensor</td>
</tr>
<tr>
<td>A/C WAIMEA ATHLETIC FIELD BUS STOP</td>
<td>21.958824</td>
<td>-159.674196</td>
<td>LED</td>
<td>2</td>
<td>1</td>
<td>Yes</td>
<td>Daily</td>
<td>Dusk till Dawn</td>
<td>Liability, Safety &amp; Security</td>
<td>Photo-sensor</td>
</tr>
<tr>
<td>LOCATION</td>
<td>TAX MAP KEY</td>
<td>Light Type</td>
<td>Frequency of Night Usage</td>
<td>Duration of Night Usage</td>
<td>Legal Requirement for Lighting</td>
<td>Note</td>
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<tr>
<td>A</td>
<td>1-8-02-20</td>
<td>A = 4:00-8:00 AM</td>
<td>As needed</td>
<td>Liability, safety &amp; security.</td>
<td>All exterior lights are shielded or are floodlights.</td>
<td></td>
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</tr>
<tr>
<td>A</td>
<td>2-5-06-5</td>
<td>B = Fluorescent Lamps Under roof</td>
<td>Daily</td>
<td>Liability, safety &amp; security.</td>
<td>All lights are shielded or under eaves.</td>
<td></td>
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</tr>
<tr>
<td>A</td>
<td>3-3-03-01</td>
<td>B = parking lamp</td>
<td>As needed</td>
<td>Liability, safety &amp; security.</td>
<td>All flood lights are angled down. Fluorescent accent light is currently not working.</td>
<td></td>
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</tr>
<tr>
<td>A</td>
<td>4-3-02-4</td>
<td>B = 150 watt high pressure sodium (HPS)</td>
<td>Daily</td>
<td>Liability, safety &amp; security.</td>
<td>All flood lights are angled down. Fluorescent accent light is currently not working.</td>
<td></td>
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</tr>
<tr>
<td>A</td>
<td>6-3-04-1</td>
<td>Fluorescent Under roof</td>
<td>Daily</td>
<td>Liability, safety &amp; security.</td>
<td>All flood lights are angled down. Fluorescent accent light is currently not working.</td>
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</tr>
<tr>
<td>A</td>
<td>7-6-05-11</td>
<td>Fluorescent Lamps Under roof</td>
<td>Daily</td>
<td>Liability, safety &amp; security.</td>
<td>All flood lights are angled down. Fluorescent accent light is currently not working.</td>
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</tr>
<tr>
<td>A</td>
<td>8-2-14</td>
<td>Fluorescent Lamps Under roof</td>
<td>Daily</td>
<td>Liability, safety &amp; security.</td>
<td>All flood lights are angled down. Fluorescent accent light is currently not working.</td>
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<tr>
<td>A</td>
<td>9-2-06-4</td>
<td>Fluorescent Lamps Under roof</td>
<td>Daily</td>
<td>Liability, safety &amp; security.</td>
<td>All flood lights are angled down. Fluorescent accent light is currently not working.</td>
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<tr>
<td>A</td>
<td>10-6-06-4</td>
<td>Fluorescent Lamps Under roof</td>
<td>Daily</td>
<td>Liability, safety &amp; security.</td>
<td>All flood lights are angled down. Fluorescent accent light is currently not working.</td>
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<tr>
<td>A</td>
<td>11-3-04-2</td>
<td>Fluorescent Lamps Under roof</td>
<td>Daily</td>
<td>Liability, safety &amp; security.</td>
<td>All flood lights are angled down. Fluorescent accent light is currently not working.</td>
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</tr>
<tr>
<td>A</td>
<td>12-3-05-4</td>
<td>Fluorescent Lamps Under roof</td>
<td>Daily</td>
<td>Liability, safety &amp; security.</td>
<td>All flood lights are angled down. Fluorescent accent light is currently not working.</td>
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</tr>
<tr>
<td>A</td>
<td>13-9-05-4</td>
<td>Fluorescent Lamps Under roof</td>
<td>Daily</td>
<td>Liability, safety &amp; security.</td>
<td>All flood lights are angled down. Fluorescent accent light is currently not working.</td>
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</tr>
<tr>
<td>A</td>
<td>14-2-06-4</td>
<td>Fluorescent Lamps Under roof</td>
<td>Daily</td>
<td>Liability, safety &amp; security.</td>
<td>All flood lights are angled down. Fluorescent accent light is currently not working.</td>
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<tr>
<td>A</td>
<td>15-6-06-4</td>
<td>Fluorescent Lamps Under roof</td>
<td>Daily</td>
<td>Liability, safety &amp; security.</td>
<td>All flood lights are angled down. Fluorescent accent light is currently not working.</td>
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<tr>
<td>A</td>
<td>16-2-05-4</td>
<td>Fluorescent Lamps Under roof</td>
<td>Daily</td>
<td>Liability, safety &amp; security.</td>
<td>All flood lights are angled down. Fluorescent accent light is currently not working.</td>
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<tr>
<td>A</td>
<td>17-3-04-2</td>
<td>Fluorescent Lamps Under roof</td>
<td>Daily</td>
<td>Liability, safety &amp; security.</td>
<td>All flood lights are angled down. Fluorescent accent light is currently not working.</td>
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</tr>
<tr>
<td>A</td>
<td>18-4-04-2</td>
<td>Fluorescent Lamps Under roof</td>
<td>Daily</td>
<td>Liability, safety &amp; security.</td>
<td>All flood lights are angled down. Fluorescent accent light is currently not working.</td>
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</tr>
<tr>
<td>A</td>
<td>19-3-05-4</td>
<td>Fluorescent Lamps Under roof</td>
<td>Daily</td>
<td>Liability, safety &amp; security.</td>
<td>All flood lights are angled down. Fluorescent accent light is currently not working.</td>
<td></td>
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</tr>
<tr>
<td>A</td>
<td>20-3-06-4</td>
<td>Fluorescent Lamps Under roof</td>
<td>Daily</td>
<td>Liability, safety &amp; security.</td>
<td>All flood lights are angled down. Fluorescent accent light is currently not working.</td>
<td></td>
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</tr>
<tr>
<td>A</td>
<td>21-4-04-2</td>
<td>Fluorescent Lamps Under roof</td>
<td>Daily</td>
<td>Liability, safety &amp; security.</td>
<td>All flood lights are angled down. Fluorescent accent light is currently not working.</td>
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<tr>
<td>A</td>
<td>22-5-04-2</td>
<td>Fluorescent Lamps Under roof</td>
<td>Daily</td>
<td>Liability, safety &amp; security.</td>
<td>All flood lights are angled down. Fluorescent accent light is currently not working.</td>
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<tr>
<td>A</td>
<td>23-6-04-2</td>
<td>Fluorescent Lamps Under roof</td>
<td>Daily</td>
<td>Liability, safety &amp; security.</td>
<td>All flood lights are angled down. Fluorescent accent light is currently not working.</td>
<td></td>
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</tr>
<tr>
<td>A</td>
<td>24-7-04-2</td>
<td>Fluorescent Lamps Under roof</td>
<td>Daily</td>
<td>Liability, safety &amp; security.</td>
<td>All flood lights are angled down. Fluorescent accent light is currently not working.</td>
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</tr>
<tr>
<td>A</td>
<td>25-8-04-2</td>
<td>Fluorescent Lamps Under roof</td>
<td>Daily</td>
<td>Liability, safety &amp; security.</td>
<td>All flood lights are angled down. Fluorescent accent light is currently not working.</td>
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<tr>
<td>A</td>
<td>26-9-04-2</td>
<td>Fluorescent Lamps Under roof</td>
<td>Daily</td>
<td>Liability, safety &amp; security.</td>
<td>All flood lights are angled down. Fluorescent accent light is currently not working.</td>
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<tr>
<td>A</td>
<td>27-0-04-2</td>
<td>Fluorescent Lamps Under roof</td>
<td>Daily</td>
<td>Liability, safety &amp; security.</td>
<td>All flood lights are angled down. Fluorescent accent light is currently not working.</td>
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<tr>
<td>A</td>
<td>28-1-04-2</td>
<td>Fluorescent Lamps Under roof</td>
<td>Daily</td>
<td>Liability, safety &amp; security.</td>
<td>All flood lights are angled down. Fluorescent accent light is currently not working.</td>
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<tr>
<td>A</td>
<td>29-2-04-2</td>
<td>Fluorescent Lamps Under roof</td>
<td>Daily</td>
<td>Liability, safety &amp; security.</td>
<td>All flood lights are angled down. Fluorescent accent light is currently not working.</td>
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</tr>
<tr>
<td>A</td>
<td>30-3-04-2</td>
<td>Fluorescent Lamps Under roof</td>
<td>Daily</td>
<td>Liability, safety &amp; security.</td>
<td>All flood lights are angled down. Fluorescent accent light is currently not working.</td>
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<td></td>
</tr>
<tr>
<td>A</td>
<td>31-4-04-2</td>
<td>Fluorescent Lamps Under roof</td>
<td>Daily</td>
<td>Liability, safety &amp; security.</td>
<td>All flood lights are angled down. Fluorescent accent light is currently not working.</td>
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<tr>
<td>A</td>
<td>32-5-04-2</td>
<td>Fluorescent Lamps Under roof</td>
<td>Daily</td>
<td>Liability, safety &amp; security.</td>
<td>All flood lights are angled down. Fluorescent accent light is currently not working.</td>
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<tr>
<td>A</td>
<td>33-6-04-2</td>
<td>Fluorescent Lamps Under roof</td>
<td>Daily</td>
<td>Liability, safety &amp; security.</td>
<td>All flood lights are angled down. Fluorescent accent light is currently not working.</td>
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<tr>
<td>A</td>
<td>34-7-04-2</td>
<td>Fluorescent Lamps Under roof</td>
<td>Daily</td>
<td>Liability, safety &amp; security.</td>
<td>All flood lights are angled down. Fluorescent accent light is currently not working.</td>
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<tr>
<td>A</td>
<td>35-8-04-2</td>
<td>Fluorescent Lamps Under roof</td>
<td>Daily</td>
<td>Liability, safety &amp; security.</td>
<td>All flood lights are angled down. Fluorescent accent light is currently not working.</td>
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<tr>
<td>A</td>
<td>36-9-04-2</td>
<td>Fluorescent Lamps Under roof</td>
<td>Daily</td>
<td>Liability, safety &amp; security.</td>
<td>All flood lights are angled down. Fluorescent accent light is currently not working.</td>
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<tr>
<td>A</td>
<td>37-0-04-2</td>
<td>Fluorescent Lamps Under roof</td>
<td>Daily</td>
<td>Liability, safety &amp; security.</td>
<td>All flood lights are angled down. Fluorescent accent light is currently not working.</td>
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</tr>
<tr>
<td>LOCATION</td>
<td>TAX MAP KEY</td>
<td>Light Type</td>
<td>No. of Lamps</td>
<td>Regular Usage</td>
<td>Frequency of Night Usage</td>
<td>Duration of Night Usage</td>
<td>Legal Requirement for Lighting</td>
<td>Notes</td>
<td></td>
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<tr>
<td>HANAPERE BAISEXED OFFICE</td>
<td>1-8-06-75</td>
<td>A = 250 watt high Pressure Sodium Light</td>
<td>3</td>
<td>A = 30</td>
<td>Daily</td>
<td>4:00 AM and 6:00 AM</td>
<td>Liability, safety &amp; security</td>
<td>All lights are under eaves.</td>
<td></td>
<td></td>
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<tr>
<td>HANAPERE FIRE STATION</td>
<td>1-8-06-47</td>
<td>A = 150 watt High Pressure Sodium Light</td>
<td>3</td>
<td>A = 2</td>
<td>A and B = Daily</td>
<td>C = As needed</td>
<td>Dusk To Down</td>
<td>Liability, safety &amp; security</td>
<td>All lights are under eaves.</td>
<td></td>
</tr>
<tr>
<td>HANAPERE REFUSE TRANSFER STATION</td>
<td>1-8-06-75</td>
<td>A = Flood Light</td>
<td>3</td>
<td>A = 3</td>
<td>B = Evenings only</td>
<td>Dusk to Down for the floodlight</td>
<td>Liability, safety &amp; security</td>
<td>A = Style removed and not replaced due to threat to shearwaters. B = angle.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>KALAHUO FIRE STATION</td>
<td>2-3-03-06</td>
<td>A = 150 watt high Pressure Sodium Light</td>
<td>3</td>
<td>A = 4</td>
<td>C = No</td>
<td>B = All Night</td>
<td>Dusk To Down</td>
<td>Liability, safety &amp; security</td>
<td>All lights are under eaves.</td>
<td></td>
</tr>
<tr>
<td>KALEPAPA VILLAGE APARTMENTS</td>
<td>3-8-08-01</td>
<td>A = Flood Light</td>
<td>3</td>
<td>A = 10</td>
<td>B = 23</td>
<td>C = 18</td>
<td>Daily</td>
<td>Dusk To Down</td>
<td>Liability, safety &amp; security</td>
<td>A and F = angle and shielded. B = all night.</td>
</tr>
<tr>
<td>KAPA‘A SWIMMING POOL &amp; BATH HOUSE</td>
<td>6-4-01-01</td>
<td>A = 100 watt Pole Lights</td>
<td>3</td>
<td>A = 4</td>
<td>Y</td>
<td>Dusk To Down</td>
<td>Liability, safety &amp; security</td>
<td>Used for lawn practices.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>KAPAA TOWN GENERATION BUILDING</td>
<td>6-4-11-04</td>
<td>A = High Pressure Sodium Light</td>
<td>3</td>
<td>A = 1</td>
<td>B = All Night</td>
<td>Liability, safety &amp; security</td>
<td>A and B = angled and shielded. C and D = angled, shielded, and under eaves.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>KANAI ECONOMIC OPPORTUNITY (KSO)</td>
<td>3-4-05-60</td>
<td>A = 150 watt high pressure sodium bulb</td>
<td>3</td>
<td>A = 3</td>
<td>B = Daily</td>
<td>Dusk To Down</td>
<td>Liability, safety &amp; security</td>
<td>A and B = angled and shielded. C and D = angled, shielded, and under eaves.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>KOA WORKFORCE HOUSING DEVELOPMENT</td>
<td>2-4-04-05</td>
<td>A = 60 watt LED</td>
<td>3</td>
<td>A = 2</td>
<td>Daily</td>
<td>A on auto sensor</td>
<td>Liability, safety &amp; security</td>
<td>A = angled. B &amp; D = under eaves.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>KOLOPUNA WORKFORCE HOUSING APARTMENTS</td>
<td>5-4-08-58</td>
<td>A = 14 watt LED</td>
<td>3</td>
<td>A = 30</td>
<td>Daily</td>
<td>Liability, safety &amp; security</td>
<td>A = angled and shielded. B &amp; D = under eaves.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>KUHAU CIVIC CENTER</td>
<td>3-6-05-27 A 18</td>
<td>A = Compact 13 watt</td>
<td>3</td>
<td>A = 20</td>
<td>Daily</td>
<td>Dusk To Down</td>
<td>Liability, safety &amp; security</td>
<td>All Hawaii and roof above them except for parking lights when lights are on.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>KUHAU COUNTY BUILDING &amp; ANNEX</td>
<td>3-6-05-02 &amp; 03</td>
<td>A = Compact 13 watt</td>
<td>3</td>
<td>A = 20</td>
<td>Daily</td>
<td>Dusk To Down</td>
<td>Liability, safety &amp; security</td>
<td>All Hawaii and roof above them except for parking lights when lights are on.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LIHUE NEIGHBORHOOD CENTER</td>
<td>3-7-10-14</td>
<td>A = Work Day Lights</td>
<td>3</td>
<td>A = 6</td>
<td>N</td>
<td>Daily</td>
<td>As needed</td>
<td>Liability, safety &amp; security</td>
<td>All lights are shielded under eaves.</td>
<td></td>
</tr>
<tr>
<td>LIHUE REFUSE TRANSFER STATION</td>
<td>3-7-01-14</td>
<td>A = Flood Light</td>
<td>3</td>
<td>A = 10</td>
<td>B = 3</td>
<td>N</td>
<td>Daily</td>
<td>Dusk To Down</td>
<td>Liability, safety &amp; security</td>
<td>As needed.</td>
</tr>
<tr>
<td>LIMA OLA WORKFORCE HOUSING DEVELOPMENT</td>
<td>2-1-06-58</td>
<td>A = flood light</td>
<td>3</td>
<td>A = 2</td>
<td>B = Daily</td>
<td>Dusk To Down</td>
<td>Liability, safety &amp; security</td>
<td>All lights are shielded.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PANNAU VILLAGE APARTMENTS PHASE I</td>
<td>2-6-08-60</td>
<td>A = 30 watt floodlight bulb</td>
<td>3</td>
<td>A = 10</td>
<td>B = 3</td>
<td>Daily</td>
<td>Dusk To Down</td>
<td>Liability, safety &amp; security</td>
<td>A = angled and shielded. B = Under eaves.</td>
<td></td>
</tr>
<tr>
<td>PANNAU VILLAGE APARTMENTS PHASE II</td>
<td>3-6-08-46</td>
<td>A = 30 watt floodlight bulb</td>
<td>3</td>
<td>A = 10</td>
<td>B = 3</td>
<td>Daily</td>
<td>Liability, safety &amp; security</td>
<td>A = angled and shielded. B &amp; D = under eaves.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LOCATION</td>
<td>TAX MAP KEY</td>
<td>Light Type</td>
<td>Assigned Category</td>
<td>No. of Lamps</td>
<td>Regular Usage</td>
<td>Frequency of Night Usage</td>
<td>Duration of Night Usage</td>
<td>Legal Requirement for Lighting</td>
<td>Notes</td>
<td></td>
</tr>
<tr>
<td>----------</td>
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<td>--------------------------------</td>
<td>-------</td>
<td></td>
</tr>
<tr>
<td>POLICE/DOCTOR MALL FACILITY</td>
<td>3-4-00-14</td>
<td>A = 150 watt HPS Parking Lot Lights B = 150 watt HPS High Bay Lights C = 40 watt Recirculated Fluorescent Lights D = 70 watt HPS Vertical Accent Lights E = 15 watt Compact Fluorescent Well Spacelight F = 70 watt HPS Walkway Ballast G = 30 watt fluorescent Y Turtles</td>
<td>3</td>
<td>A = 20 B = 5 C = 18 D = 60 E = 10 F = 70 G = 6</td>
<td>Y</td>
<td>Daily</td>
<td>Parking lights turn on at 6:00 PM and turn off at 10:00 PM. The rest are on all night. 6:00 PM To 10:00 PM.</td>
<td>Liability, safety &amp; security.</td>
<td>A and B = angled and shielded C-G = under awning.</td>
<td></td>
</tr>
<tr>
<td>SALT POND PARK</td>
<td>1-8-08-43</td>
<td>150 watt High Pressure Sodium Lights</td>
<td>3</td>
<td>6</td>
<td>Y</td>
<td>Daily</td>
<td>Parking lot lights fully shielded.</td>
<td>Liability, safety &amp; security.</td>
<td>Parking lights under awning.</td>
<td></td>
</tr>
<tr>
<td>SMOKY VALLEY CLUBHOUSE</td>
<td>1-8-04-12</td>
<td>Flood Lights</td>
<td>3</td>
<td>4</td>
<td>Y</td>
<td>Daily</td>
<td>Dusk to Dawn</td>
<td>Liability, safety &amp; security.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SHOPLIFT HORN PARK</td>
<td>2-6-01-10</td>
<td>A = Parking Lot Lights B = Sodium Parking Lot Lights C = 50 watt Sodium Recessed Blg. Lights D = 60 watt Incandescent Softmounts</td>
<td>3</td>
<td>A = 5 B = 4 C = 6</td>
<td>Y</td>
<td>Daily</td>
<td>Dusk to Dawn</td>
<td>Liability, safety &amp; security.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRANSPORTATION BASEYARD OFFICE</td>
<td>3-13-05</td>
<td>A = 30 watt HPS Well Lanterns B = 150 watt HPS Pole Lights C = 200 watt HPS Floodlights D = 40 watt Incandescent Softmounts</td>
<td>3</td>
<td>A = 5 B = 15 C = 10</td>
<td>Y</td>
<td>Daily</td>
<td>Dusk to Dawn</td>
<td>Liability, safety &amp; security.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WAINA-TEIRE &amp; PULZEI</td>
<td>1-6-07-48</td>
<td>A = Sodium High Pressure Sodium Lights B = 84 watt Compact Fluorescent Lanterns</td>
<td>3</td>
<td>B = 20</td>
<td>Y</td>
<td>Daily</td>
<td>Dusk to Dawn</td>
<td>Liability, safety &amp; security.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WAINA NEIGHBORHOOD CENTER</td>
<td>1-6-09-23</td>
<td>A = Parking Lot Lights B = Fluorescent Fixtures</td>
<td>3</td>
<td>A = 5 B = 5</td>
<td>Y</td>
<td>Daily</td>
<td>Dusk To Dawn</td>
<td>Liability, safety &amp; security.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WAINA POOL</td>
<td>1-6-09-23</td>
<td>A = 100 watt Pool Deck Lights</td>
<td>3</td>
<td>A = 4</td>
<td>Y</td>
<td>Daily</td>
<td>Dusk To Dawn</td>
<td>Liability, safety &amp; security.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WAINA TENNIS COURT</td>
<td>1-6-05-06</td>
<td>Fluorescent</td>
<td>3</td>
<td>16</td>
<td>Y</td>
<td>Daily</td>
<td>6:00PM To 10:00PM</td>
<td>Off-During Fleeting Season.</td>
<td>Liability, safety &amp; security.</td>
<td></td>
</tr>
<tr>
<td>WAINA THEATRE</td>
<td>1-6-09-06</td>
<td>A = 70 watt metal halide lamp B = 32 watt two-lamp fluorescent C = 25 watt HPS</td>
<td>3</td>
<td>A = 5 B = 15 C = 10</td>
<td>Y</td>
<td>As needed</td>
<td>As needed</td>
<td>Liability, safety &amp; security.</td>
<td>A = engine and shaded B = under eaves</td>
<td></td>
</tr>
<tr>
<td>WAINA GREEN WATER TREATMENT PLANT</td>
<td>1-2-06-36</td>
<td>Sodium Lights A. 60 watt lights B</td>
<td>3</td>
<td>A = 4 B = 2</td>
<td>A = Not in use. B = Nightly</td>
<td>A is used only for after hours operations. B is used 10 hours a day.</td>
<td>Liability, safety &amp; security.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ANAHOLA VILLAGE HALL</td>
<td>4-6-08-07</td>
<td>1,000 watt Metal Halide</td>
<td>4</td>
<td>8</td>
<td>Y</td>
<td>Daily</td>
<td>6:00PM To Off-During Fleeting Season.</td>
<td>Off-During Fleeting Season.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>KAPAA NEW BASE YARD</td>
<td>4-5-15-04</td>
<td>A = 90 watt Compact Lights B = 270 watt Compact Lights C = 150 watt HPS Lamps</td>
<td>4</td>
<td>A = 20 B = 50 C = 65</td>
<td>Y</td>
<td>Daily</td>
<td>A &amp; B = 6:00PM &amp; 8:00AM C = 4:00AM-6:00AM</td>
<td>Liability, safety &amp; security.</td>
<td>All facility lights are fully shielded.</td>
<td></td>
</tr>
<tr>
<td>KAUNA WARR MEMORIAL COMMEMORATION HALL &amp; OFFICES</td>
<td>3-6-02-09</td>
<td>A = 40 watt Spring Lamps B = 80 watt Spring Lamps C = 30 watt CFL Lamps D = 20 watt CFL Lamps</td>
<td>4</td>
<td>A = 10 B = 20 C = 40 D = 75</td>
<td>Y</td>
<td>Daily</td>
<td>A &amp; B = 9:30AM To 11:30PM C = 10:00AM To 11:00PM</td>
<td>Liability, safety &amp; security.</td>
<td>Building, parking lighting.</td>
<td></td>
</tr>
<tr>
<td>KOLOA NEIGHBORHOOD CENTER</td>
<td>2-6-08-17</td>
<td>Sodium Lights A. 60 watt lights B</td>
<td>4</td>
<td>A = 5 B = 10 C = 24 D = All Week</td>
<td>Y</td>
<td>Daily</td>
<td>Dusk To Dawn</td>
<td>Liability, safety &amp; security.</td>
<td>All facility lights are fully shielded.</td>
<td></td>
</tr>
<tr>
<td>LEIHE自動車検査場</td>
<td>2-6-01-00</td>
<td>Sodium Security Lights</td>
<td>4</td>
<td>5</td>
<td>Y</td>
<td>Daily</td>
<td>6:00PM To 10:00PM</td>
<td>Off-During Fleeting Season.</td>
<td>Liability, safety &amp; security.</td>
<td>Radio Control (On-Demand By User) Off-During Fleeting Season.</td>
</tr>
<tr>
<td>LEIHE WASTEWATER TREATMENT PLANT</td>
<td>3-6-02-13</td>
<td>1000 watt incandescent</td>
<td>4</td>
<td>32</td>
<td>Y</td>
<td>Daily</td>
<td>6:00PM To 10:00PM</td>
<td>Off-During Fleeting Season.</td>
<td>Liability, safety &amp; security.</td>
<td>A = Light case. B = Shielded C-D = Under awning.</td>
</tr>
<tr>
<td>WAILUA HOUSELOTS PARK</td>
<td>4-1-16-42</td>
<td>A = 100 watt Sodium Lamps B = 1,500 watt Metal Halide C = 800 watt Metal Halide</td>
<td>4</td>
<td>A = 10 B = 10</td>
<td>Y</td>
<td>Daily</td>
<td>A &amp; B = 7:00PM To 10:00PM</td>
<td>Liability, safety &amp; security.</td>
<td>A = parking lots B = tennis courts (On-Demand By User)</td>
<td></td>
</tr>
<tr>
<td>FAYE PARK (KEKAHA)</td>
<td>1-3-02-07</td>
<td>A = 1,500 watt Metal Halide Lights B = 1,500 watt Metal Halide Lights</td>
<td>5</td>
<td>A = 16 B = 10</td>
<td>Y</td>
<td>Daily</td>
<td>6:00PM To 10:00PM</td>
<td>Off-During Fleeting Season.</td>
<td>Liability, safety &amp; security.</td>
<td>Tennis Court (On-Demand By User) Off-During Fleeting Season.</td>
</tr>
<tr>
<td>HAIPAPESI STADIUM</td>
<td>1-8-06-01</td>
<td>A = 1,500 watt Metal Halide Lights B = 1,500 watt Metal Halide Lights</td>
<td>5</td>
<td>A = 16 B = 10</td>
<td>Y</td>
<td>Daily</td>
<td>6:00PM To 10:00PM</td>
<td>Off-During Fleeting Season.</td>
<td>Liability, safety &amp; security.</td>
<td>Tennis Court (On-Demand By User) Off-During Fleeting Season.</td>
</tr>
<tr>
<td>LOCATION</td>
<td>TAX MAP KEY</td>
<td>Light Type</td>
<td>Regular Usage</td>
<td>No. of Lamps</td>
<td>Frequency of Night Usage</td>
<td>Duration of Night Usage</td>
<td>Legal Requirement for Lighting</td>
<td>Notes</td>
<td></td>
<td></td>
</tr>
<tr>
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<td>------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ISENBERG PARK</td>
<td>3-8-15-24</td>
<td>1,000 watt Metal Halide</td>
<td>Y</td>
<td>40</td>
<td>Daily</td>
<td>6:00 PM To 10:00 PM</td>
<td>Liability, safety &amp; security</td>
<td>Off During Fledgling Season</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Basketball Court (On-Demand By User)</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Softball Field (By Permit, On-Demand By User)</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Off During Fledgling Season</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Anahola Beach Park; Picnic Areas, Camping, Lighted Comfort Station (1.54 Ac.)
<table>
<thead>
<tr>
<th>Facility Name:</th>
<th>Anahola Beach Park</th>
</tr>
</thead>
<tbody>
<tr>
<td>TMK Parcel No.:</td>
<td>4-8-14:06</td>
</tr>
<tr>
<td>Facility Type:</td>
<td>Beach Park</td>
</tr>
<tr>
<td>Size:</td>
<td>Unknown</td>
</tr>
<tr>
<td>Lighting Information:</td>
<td>- The comfort station is lit by interior and exterior fluorescent lights.</td>
</tr>
<tr>
<td>Facility Lighting:</td>
<td>Yes</td>
</tr>
<tr>
<td>Lighting Controls:</td>
<td>Manual</td>
</tr>
</tbody>
</table>
'Ele'ele Park; Little League & Softball Fields, Comfort Station, Pavilion, Basketball Courts (lighted—but lights no longer operable). (2.86 Ac.)
<table>
<thead>
<tr>
<th>Facility Name:</th>
<th>Haena Beach Park</th>
</tr>
</thead>
<tbody>
<tr>
<td>TMK Parcel No.:</td>
<td>Unknown</td>
</tr>
<tr>
<td>Facility Type:</td>
<td>Beach Park</td>
</tr>
<tr>
<td>Size:</td>
<td>Unknown</td>
</tr>
<tr>
<td>Facility Lighting:</td>
<td>Yes</td>
</tr>
<tr>
<td>Lighting Controls:</td>
<td>Manual</td>
</tr>
<tr>
<td>Lighting Information:</td>
<td>-The comfort station is lit by interior and exterior fluorescent lights.</td>
</tr>
<tr>
<td>Facility Name:</td>
<td>Hanalei Pavilion Park</td>
</tr>
<tr>
<td>-------------------</td>
<td>------------------------------------------</td>
</tr>
<tr>
<td>Facility Type:</td>
<td>Beach Park</td>
</tr>
<tr>
<td>Size:</td>
<td>Unknown</td>
</tr>
<tr>
<td>TMK Parcel No.:</td>
<td>5-5-002:019</td>
</tr>
<tr>
<td>Facility Lighting:</td>
<td>Yes</td>
</tr>
<tr>
<td>Lighting Controls:</td>
<td>Manual</td>
</tr>
</tbody>
</table>

_Pavilion and comfort station are lit by interior and exterior fluorescent lights._
<table>
<thead>
<tr>
<th>Facility Name:</th>
<th>Hanalei Refuse Transfer Station</th>
</tr>
</thead>
<tbody>
<tr>
<td>TMK Parcel No.:</td>
<td>5-3-01-17</td>
</tr>
<tr>
<td>Facility Type:</td>
<td>Transfer Station</td>
</tr>
<tr>
<td>Size:</td>
<td>1.454 Ac.</td>
</tr>
</tbody>
</table>

**Lighting Information:**

- The compactor area, comfort station and sheds have external lighting.

<table>
<thead>
<tr>
<th>Facility Lighting:</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lighting Controls:</td>
<td>Manual</td>
</tr>
</tbody>
</table>
Kalaheo Park (2.679 Ac.); baseball/softball diamond, no exterior lighting, shelter.
<table>
<thead>
<tr>
<th>Facility Name:</th>
<th>Kapaa Refuse Transfer Station</th>
</tr>
</thead>
<tbody>
<tr>
<td>TMK Parcel No.:</td>
<td>4-6-12:4</td>
</tr>
<tr>
<td>Facility Lighting:</td>
<td>Yes</td>
</tr>
<tr>
<td>Lighting Controls:</td>
<td>Unknown</td>
</tr>
</tbody>
</table>

**Lighting Information:**

- Compactor, Operator’s Shed and Comfort Station are all lit.
<table>
<thead>
<tr>
<th>Facility Name:</th>
<th></th>
<th>Lighting Information:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Līhu'e Civic Center</td>
<td></td>
<td>- Mo'ikeha, Kapule and Pi'ikoi Buildings all have area and parking lighting.</td>
<td></td>
</tr>
<tr>
<td>Facility Type:</td>
<td>Office Buildings</td>
<td>Facility Lighting:</td>
<td>Yes</td>
</tr>
<tr>
<td>Size:</td>
<td>1.5369 Ac.</td>
<td>Lighting Controls:</td>
<td>Unknown</td>
</tr>
<tr>
<td>TMK Parcel No.:</td>
<td>3-6-5:27</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Diagram:**
- Līhu'e Civic Center
- Rice Street
- Kaumualii Highway

**Map/Facility Sheets:**
- County of Kauai
- Attachment B Map/Facility Sheets
Līhu'e Civic Center; Mo'ikeha, Kapule and Pi'ikoi Buildings (1.5369 Ac.)

Kaumuali'i Highway

Feet
Facility Name: Lydgate Park
TMK Parcel No.: 3-9-60:01
Facility Type: Regional Park (Type I)
Size: 57.85 Ac.

Lighting Information:
-Lydgate park consists of a complex of comfort stations, picnic shelters, pavilions, and ocean pools connected by bike/jogging paths.
Waioli Town Park; lighted basketball court, soccer field (24.2 Ac.)
Facility Name: Wai’oli Town Park

Facility Type: Neighborhood Park (Type IV)

Size: 24.2 Ac.

TMK Parcel No.: 5-5-06:08

Facility Lighting: Yes

Lighting Controls: n/a

Lighting Information:
- The basketball court and soccer field are now unlit. The poles were removed in February, 2016.
Facility Name: Anahola Village Park

Facility Type: Neighborhood Park (Type IV)

Size: 6.99 Acres

TMK Parcel No.: 4-8-09:01

Facility Lighting: Yes

Lighting Controls:
Programmed online with a one-hour manual switch also.

Lighting Information:
- Pavilion and comfort station have external and internal fluorescent lighting.
- Basketball court has two poles with two fixtures each; all are shielded.
- Play field and playground are unlit.
<table>
<thead>
<tr>
<th>Facility Name:</th>
<th>Ele'ele Sewage Treatment Plant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facility Type:</td>
<td>Sanitation</td>
</tr>
<tr>
<td>Size:</td>
<td>4.7 Ac.</td>
</tr>
<tr>
<td>TMK Parcel No.:</td>
<td>2-1-01:43</td>
</tr>
<tr>
<td>Facility Lighting:</td>
<td>Yes</td>
</tr>
<tr>
<td>Lighting Controls:</td>
<td>Unknown</td>
</tr>
<tr>
<td>Lighting Information:</td>
<td>-14 x Sodium Parking Lights</td>
</tr>
<tr>
<td></td>
<td>-4 x Sodium Flood Lights</td>
</tr>
<tr>
<td></td>
<td>-6 x Exterior Wall Fixtures</td>
</tr>
<tr>
<td>Facility Name:</td>
<td>TMK Parcel No.:</td>
</tr>
<tr>
<td>-----------------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>Kapa'a New Base Yard</td>
<td>4-5-15:04</td>
</tr>
<tr>
<td>Facility Type:</td>
<td>Facility Lighting:</td>
</tr>
<tr>
<td>Base Yard</td>
<td>Yes</td>
</tr>
<tr>
<td>Size:</td>
<td>Lighting Controls:</td>
</tr>
<tr>
<td>8 Ac.</td>
<td>6:00PM-6:00AM</td>
</tr>
</tbody>
</table>
Kauai War Memeorial Convention Hall; convention hall, office buildings, office trailers (9.043 Ac.)
<table>
<thead>
<tr>
<th>Facility Name:</th>
<th>Kauai War Memorial Convention Hall</th>
</tr>
</thead>
<tbody>
<tr>
<td>TMK Parcel No.:</td>
<td>3-6-2:9</td>
</tr>
<tr>
<td>Facility Type:</td>
<td>Convention Hall &amp; Office Building</td>
</tr>
<tr>
<td>Size:</td>
<td>9.043 Ac.</td>
</tr>
<tr>
<td>Facility Lighting:</td>
<td>Yes</td>
</tr>
<tr>
<td>Lighting Controls:</td>
<td>Unknown</td>
</tr>
<tr>
<td>Lighting Information:</td>
<td>-Convention hall, office buildings, office trailers and parking all have area lighting.</td>
</tr>
</tbody>
</table>
Kekaha Landfill; TMK No. 1-2-02:09
Parking and Security Lighting
(35.67 Ac.)
<table>
<thead>
<tr>
<th>Facility Name:</th>
<th>Kekaha Landfill</th>
<th>TMK Parcel No.:</th>
<th>1-2-02:09</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facility Type:</td>
<td>Sanitation</td>
<td>Facility Lighting:</td>
<td>Yes</td>
</tr>
<tr>
<td>Size:</td>
<td>35.67 Ac.</td>
<td>Lighting Information:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>-9 x 400 watt Sodium Parking Lights</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>-5 x 50 watt Recessed Sodium Building Lights</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>-5 x 75 watt Incandescent Lights</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>-3 x High Pressure Sodium Lights</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>-Lights are in use all week, from dusk until dawn.</td>
<td></td>
</tr>
<tr>
<td>Facility Name:</td>
<td>Kōloa Neighborhood Center</td>
<td></td>
<td></td>
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<td>---------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TMK Parcel No.:</td>
<td>2-8-08:17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Facility Type:</td>
<td>Community Center</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Size:</td>
<td>0.97 Ac.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lighting Information:</td>
<td>- 5 x 150 watt High Pressure Sodium Lights</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- 16 x Fluorescent Exterior Security Lights</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- 6 x Exterior Wall Fixtures</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Lights are on all night.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lighting Controls:</td>
<td>7:00PM-7:00AM</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Facility Name: Līhu'e Auto Maintenance Garage & Office

Facility Type: Maintenance Garage

Size: 1.54 Ac.

TMK Parcel No.: 3-8-05:17

Facility Lighting: Yes

Lighting Controls: Unknown

Lighting Information:
-5 x Sodium Security Lights
-Lights are on nightly from sundown until sunrise.
<table>
<thead>
<tr>
<th>Facility Name:</th>
<th>Lihu'e Sewage Treatment Plant</th>
</tr>
</thead>
<tbody>
<tr>
<td>TMK Parcel No.:</td>
<td>3-5-01:30</td>
</tr>
<tr>
<td>Facility Type:</td>
<td>Sanitation</td>
</tr>
<tr>
<td>Size:</td>
<td>5 Ac.</td>
</tr>
<tr>
<td>Facility Lighting:</td>
<td>Yes</td>
</tr>
<tr>
<td>Lighting Controls:</td>
<td>Unknown</td>
</tr>
<tr>
<td>Lighting Information:</td>
<td>-19 x Sodium Parking Lights</td>
</tr>
<tr>
<td></td>
<td>-9 x Sodium Flood Lights</td>
</tr>
<tr>
<td></td>
<td>-14 x Fluorescent Lights</td>
</tr>
<tr>
<td></td>
<td>-17 x Incandescent Lights</td>
</tr>
<tr>
<td></td>
<td>Lights are used only as needed.</td>
</tr>
<tr>
<td>Facility Name:</td>
<td>Līhu'e Tennis Courts &amp; Shelter</td>
</tr>
<tr>
<td>------------------------</td>
<td>------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>TMK Parcel No.:</td>
<td>3-6-02:10</td>
</tr>
<tr>
<td>Facility Type:</td>
<td>Neighborhood Park (Type IV)</td>
</tr>
<tr>
<td>Size:</td>
<td>1.1 Ac.</td>
</tr>
<tr>
<td>Lighting Information:</td>
<td>-12 x 1,000 watt Court Lights</td>
</tr>
<tr>
<td></td>
<td>-Lights are on daily until 10:00 PM, and until 8:00 PM during fallout season.</td>
</tr>
<tr>
<td>Facility Lighting:</td>
<td>Yes</td>
</tr>
<tr>
<td>Lighting Controls:</td>
<td>Programmed online.</td>
</tr>
</tbody>
</table>
Wailua Houselots Park; Little League/Softball Fields, Basketball Court, Pavilion, Playground Equipment, Lighted Tennis Courts, Comfort Station (10.5 Ac.)
<table>
<thead>
<tr>
<th>Facility Name:</th>
<th>Wailua Houselots Park</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facility Type:</td>
<td>Neighborhood Park (Type III)</td>
</tr>
<tr>
<td>Size:</td>
<td>10.05 Acres</td>
</tr>
<tr>
<td>TMK Parcel No.:</td>
<td>4-1-16:42</td>
</tr>
<tr>
<td>Facility Lighting:</td>
<td>Yes</td>
</tr>
<tr>
<td>Lighting Controls:</td>
<td>- Pavillion is manual; tennis court is programmed online or turned on by user.</td>
</tr>
<tr>
<td></td>
<td>- Parking area has 10:00PM timed shut off.</td>
</tr>
</tbody>
</table>

**Lighting Information:**
- Parking is lit by two shielded streetlights.
- 11 shielded lights illuminate the tennis courts.
- The comfort station and pavilion are lit by manually controlled fluorescent lights.
- The basketball court, softball diamond and soccer field are unlit.
Wailua Sewage Treatment Plant; TMK No. 3-9-06:19
Flood and Parking Lighting, (2.03 Ac.)

Wailua River State Park
Facility Name: Wailua Sewage Treatment Plant

Facility Type: Sanitation

Size: 2.03 Ac.

TMK Parcel No.: 3-9-06:19

Facility Lighting: Yes

Lighting Information:
- 12 x Sodium Parking Lights
- 2 x Sodium Floodlights
- 2 x Fluorescent Building Lights

Lighting Controls: Unknown

Floodlights are on all night, all other lights are only used during emergencies or special events.
Kalawai Park
Kīlauea Park
Isenberg Park
Kapa'a New Park
Kekaha Faye Park
Hanapepe Stadium
Wailua Golf Course
Vidinha Stadium Park
Waimea Athletic Field
Wailua Homesteads Park
Kilauea Park
Kapa'a New Park
Kekaha Faye Park
Anne Knudsen Kōloa Park
Peter Rayno Hanamā'ulu Park
Isenberg Park
Vidinha Stadium Park
Kalawai Park
Hamapepe Stadium
Anne Knudsen Kōloa Park

Legend:
- County Facilities in Category 5: Field & Stadium Lighting

Prepared For:
County of Kauai

Prepared By:
- State of Hawaii GIS
- Planning Solutions, Inc.

Source:
- State of Hawaii GIS
- Planning Solutions, Inc.

Figure:
Locations of Category 5 Facilities

Kauai County Habitat Conservation Plan
Anne Knudsen Koloa Park; Pavilion, Comfort Station, Little League and Baseball Fields, Lighted Softball, Tennis and Basketball Courts, Playground Equipment (11.28 Ac.)
**Facility Name:**
Anne Knudsen Koloa Park

**Facility Type:**
District Park (Type II)

**Size:**
11.28 Acres

**Facility Lighting:**
Yes

**TMK Parcel No.:**
2-8-05:04, 2-8-05:17, 18, & 19

**Lighting Information:**
- Baseball diamond is lit by 6 poles with 3-5 floodlights each.
- Softball diamond is lit by 2 poles with 6 floodlights.
- Basketball court and conjoined tennis courts are illuminated by 2 poles with 4 floodlights each, manually controlled.
- Pavilion is lit by interior and exterior fluorescent lights.

**Parking**
**Tennis Courts**
**Softball Diamond**
**Baseball Diamond**
**Basketball Court**
Facility Name: Hanapepe Park and Stadium
Facility Type: Stadium & District Park (Type I)
Size: 14.68 Acres

TMK Parcel No.: 1-9-09:01
Facility Lighting: Yes

Lighting Information:
- Football & baseball fields are each illuminated by 6 poles carrying ~14 floodlights per pole.
- Tennis courts have 6 poles with 2-4 streetlight type lights per pole.
- Comfort station, pavilion, announcer’s tower, bleachers, recreation center and storerooms all have external fluorescent lighting under the eaves.
Isenberg Park; Lighted Softball Field, Basketball Court, Comfort Station, Practice Football Field, Playground Equipment (9.16 Ac.)
Facility Name: Isenberg Park

Facility Type: Neighborhood Park (Type III)

Size: 9.16 Ac.

TMK Parcel No.: 3-8-15:24

Facility Lighting: Yes

Lighting Information:
- Parking lot is lit with 5 unshielded streetlights.
- Basketball court is illuminated by 4 poles supporting 2 floodlights each.
- Baseball diamond and soccer field are lit by 8 poles with 4 to 6 floodlights each. All are unshielded.
- The rec. center and gymnasium are lit with exterior fluorescent lights.

Lighting Controls:
- Softball field is manual by permit.
- Basketball court is manual.
- Parking lot is automatic.
Kalawai Park; Comfort Station, Little Leage and Baseball Fields, Lighted Softball Field, Tennis and Basketball Courts, Playground Equipment, Foodbooth, Pavilion (21.04 Ac.)
Facility Name: Kalawai Park

Facility Type: District Park (Type II)

Size: 21.04 Ac.

TMK Parcel No.: 2-4-05:13

Facility Lighting: Yes

Lighting Information:
- Softball field is lit by 6 poles with 6-8 floodlights each.
- Tennis court has 4 poles with 6 floodlights each.
- Bathrooms and 2 storerooms are lit by interior and exterior fluorescent lights.
- Basketball court and playground equipment are unlit.
- Access road has truncated streetlights.
Kapaa New Park: LL Field, Baseball, Football, Lighted Softball Field, Lighted Tennis and Roller Hockey Rink, Basketball Court (18.08 Ac.)
Facility Name: Kapaa (New) Park

Facility Type: District Park (Type II)

Size: 18.08 Ac.

TMK Parcel No.: 4-5-15:32

Facility Lighting: Yes

Lighting Controls:
- Basketball and tennis courts programmed online; others are manual.
- Football and soccer fields are lit by twelve towers with banks of floodlights, turned on by staff.
- Tennis courts and roller hockey rink are lit by streetlight type poles with manual controls.
- Pavilion is lit with manually controlled fluorescent lights.
- Baseball diamond, parking and skate park are unlit.
Kekaha Faye Park: Lighted Tennis Courts, Softball Diamond, Baseball Diamond, Practice Football Field, Track, Lighted Basketball Court, Comfort Station (8.51 Ac.)

Kekaha Rd
Kaumualii Hwy
Elepaio Rd
Amakihi Rd
Akekeke Rd
Hoomau St
Ulili Rd
Iwipolena Rd
Kala Rd
Io Rd
Kokee Rd
Amakihi Pl

KSHCP-PIP
County of Kauai
Attachment B Map/Facility Sheets 52
Facility Name: Kekaha Faye Park
Facility Type: District Park (Type II)
Size: 8.51 Ac.

TMK Parcel No.: 1-3-002:057

Facility Lighting: Yes

Lighting Information:
-6 poles with 8-10 floodlights each illuminate the baseball diamond and are manually controlled.
-2 streetlight type poles illuminate an auxiliary parking area.
-Comfort station lit with strip fluorescent lights.
-Basketball court and football practice field are unlit.
Facility Name: Kilauea Park
Facility Type: District Park (Type II)
Size: 4.93 Ac.

Facility Lighting: Yes
Lighting Controls: Manual by permit.

Lighting Information:
- The softball diamond is lit by six poles supporting approximately 6 floodlights each; the seventh pole at the far end has three fixtures.
- The rec. center is lit by interior and exterior fluorescent lights.
Peter Rayno Hanamalu Park; Lighted Softball Diamond, Basketball Court, Playground Equipment, Comfort Station (3.59 Ac.)
### Facility Name:
Peter Rayno Hanamaulu Park

### Facility Type:
Neighborhood Park (Type III)

### Size:
3.59 Ac.

### TMK Parcel No.:
3-7-003:009

### Facility Lighting:
Yes

### Lighting Information:
- 6 poles light the softball diamond; 3 poles have 3 floodlights each, and 3 have 6 floodlights each.
- The basketball court and comfort station are unlit.

### Lighting Controls:
Manually operated by staff.
<table>
<thead>
<tr>
<th>Facility Name:</th>
<th>Vidinha Stadium</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facility Type:</td>
<td>Stadium &amp; District Park (Type I)</td>
</tr>
<tr>
<td>Size:</td>
<td>34 Acres</td>
</tr>
<tr>
<td>TMK Parcel No.:</td>
<td>3-6-02:16 &amp; 3-6-02:19</td>
</tr>
</tbody>
</table>

**Facility Lighting:**
- Yes

**Lighting Information:**
- Parking area has 23 poles with streetlight-type lighting, with 1-2 lights per pole.
- Stadium has six large poles with 18 floodlights each.
- Entrance lighting consists of 6 lights contained within a tinted plexiglass lampshade.
- The stadium building is lit with external and internal fluorescent lights, seven per side.
Wailua County Golf Course; clubhouse, rental shed, cart barn, starter's shed, maintenance building, score board, comfort station, sprinkler shed, rain shelter (131.66 Ac.)
Facility Name: Wailua County Golf Course
Facility Type: Golf Course
Size: 131.66 Ac.

TMK Parcel No.: 3-9-2-4 & 3-9-5-1

Lighting Information:
- Lit facilities at Wailua County Golf Course include the clubhouse, rental shed, cart barn, starter's shed, maintenance building, score board.

Facility Lighting: Yes
Lighting Controls: Staff Operated
Facility Name: Wailua Homesteads Park

Facility Type: Neighborhood Park (Type III)

Size: 16.63 Acres

TMK Parcel No.: 4-2-03:18

Facility Lighting: Yes

Lighting Controls: Programmed Online and Manual

Lighting Information:
- Two shielded streetlight type poles illuminate the parking area.
- Tennis court is lit by 9 poles with a total of 12 shielded lights.
- Comfort station and pavilion have internal and external fluorescent lighting.
- Tennis court and pavilion can be turned on manually by user.
- Basketball court is unlit.
Waimea Athletic Field Park; Playground Equipment, Little League and Baseball Fields, Pavilion, Foodbooth, Lighted Softball Field, Basketball Courts, Comfort Station (11.73 Ac.)
Facility Name: Waimea Athletic Field Park

Facility Type: District Park (Type II)

Size: 11.73 Ac.

TMK Parcel No.: 1-2-06:38

Facility Lighting: Yes

Lighting Information:
- Softball diamond is lit with 6 poles of 2-6 floodlights each.
- Basketball court is illuminated by 4 poles with 2 street-lights each.
- Comfort station and pavilion are lit with strip fluorescent lighting.
- Other facilities are unlit.

-Softball by permit.
-Basketball on demand.
-All others programmed online.
The ‘a`o (Newell Shearwater) helps Kaua`i’s fishermen find fish at sea and only breeds here in our islands.

KAUAʻI NATIVE SEABIRDS NEED OUR HELP!

From September 15 through December 15, Kaua`i County asks for your KŌKUA while we strive to perpetuate the lives of our native birds by keeping facility lights TURNED OFF.

If you see birds on the ground, PLEASE KŌKUA, and bring them to the nearest Fire Department Aid Station.

The ‘ua`u (Hawaiian Petrel) is considered by some to be `aumakua (family guardian).

“Ho`okahi nō hua a ka `a`o”

A message brought to you by

The County of Kauaʻi
The ‘a’o (Newell Shearwater) is the only seabird endemic to Hawai‘i and only breeds here, in our islands.

KAUA‘I NATIVE SEABIRDS NEED OUR HELP!

PLEASE TURN OFF THE LIGHTS WHEN YOU LEAVE!

If you see birds on the ground, PLEASE KOKUA, and bring them to the nearest Fire Department Aid Station.

The ‘ua’u (Hawaiian Petrel) is considered by some to be ‘aumakua.

“Ho’okahi no hua a ka ‘a’o”
The ‘a’o (Newell Shearwater) is the only seabird endemic to Hawai‘i and only breeds here, in our islands.

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From September 15 through December 15, Kaua‘i County asks for your KOKUA while we strive to perpetuate the lives of our native birds by keeping facility lights TURNED OFF.

If you see birds on the ground, PLEASE KOKUA, and bring them to the nearest Fire Department Aid Station.

The ‘ua’u (Hawaiian Petrel) is considered by some to be ‘aumakua.

“Ho’okahi no hua a ka ‘a’o”
POLICY: It is the policy of the County of Kauai to manage the use of temporary flood lights on County of Kauai roads and facilities during the fledgling season of the endangered seabirds that nest on the island (principally Newell’s Shearwaters and Hawaiian Petrel) by limiting extraneous light insofar as it is reasonably practicable.

PURPOSE: From September 15 through December 15 (the “Fallout Season”), fledglings leave their nesting sites for the first time and fly out to sea. The young birds can be attracted and/or confused by bright artificial lights and, when this occurs, they sometimes circle until they become exhausted and fall to the ground, where they may be injured or killed. Such attraction constitutes harm as defined in State and Federal endangered species laws and regulations and is illegal. The intent of this policy, established in this document is to avoid and/or minimize the unnecessary use of bright artificial lighting on county roads and facilities to minimize the risk to the County of Kauai from the consequences of the law.

APPLICABILITY: This policy applies to the use and or the approval for the use of bright artificial lights on County roads and facilities for all nighttime construction work during the Fallout Season.

PROCEDURE: Night work utilizing flood lights during the period beginning September 15 and ending December 15 shall conform to the following.

Emergency Work: Work on County roads and facilities will be carried out during the Fallout Season as necessary due to emergencies. The amount of light used will be the minimum required to complete the emergency repairs in a safe and efficient manner. This policy will apply to all construction activities of the County, its contractors and/or private organizations working under the authority of the County.

<table>
<thead>
<tr>
<th>Prepared by:</th>
<th>Date last revised:</th>
<th>Page 1 of 2</th>
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</thead>
<tbody>
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</tr>
</tbody>
</table>

Original release date: 03/20/11

Reviewed by:            

Approved by: BERNARD CARVALHO, Jr. Mayor
Policy and Standard Operating Procedure
Use of Flood Lights on County Facilities

- Planned Work During the Fallout Season:
  - Work on county roads and facilities by county personnel will adhere to the following insofar as practicable:
    - Limited use of outdoor construction lighting is permissible during the hours of 2100 to 0430, inclusive.
    - Lighting fixtures shall be shielded and directed downwards to the maximum extent practicable.
    - County employees required to work at night utilizing floods lights shall be trained in how to handle any downed birds and will have appropriate equipment onsite to hold and transport any retrieved downed birds to an appropriate Save Our Shearwater (SOS) facility.
    - Training for County employees in handling downed birds shall occur on an annual basis. Attendance to training sessions shall be documented.
  - Work on County roads and facilities by others:
    - The following statement shall be incorporated in all road permits and notes on drawings or specifications and any agreements with the County for all work which occurs on County roads and other County facilities: "If system conditions require non-emergency nighttime work during the autumn seabird fallout season (September 15 through December 15), use of lighting will be restricted to between 2100 and 0430. If lighting of the work area is required in such situation, all lights will be shielded (minimum light spill towards the sky) and directed downwards to the maximum extent practicable. Minimum requirements for lighting by HIOSH and OSHA will be provided and assured by the contractor. The contractor shall train all employees working at night (records retained by the contractor) in how to handle any downed birds and will have appropriate equipment as approved by Save Our Shearwaters (SOS) on site to hold and transport any retrieved downed birds to an SOS facility. This requirement does not allow lighting as may be restricted by other government agencies."
PROTECTED SEABIRD MONITORING POLICY AND PROCEDURE

May 1, 2019

POLICY:

It is the policy of the County to monitor all County facilities with external lights used from dusk to dawn throughout each calendar year, with more frequent monitoring during the Fledgling Season, to avoid or minimize Take of protected seabirds as required by law and document any Take.

PURPOSE:

The purpose of this policy is to comply with the Federal Endangered Species Act; its state counterpart, Hawai‘i Revised Statutes § 195D; and the Kaua‘i Seabird Habitat Conservation Plan, in which the County is a participant. It is a violation of federal and state law to Take a protected species. A “Take” is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect endangered or threatened species, or to attempt to engage in any of these acts.

It is also the purpose and intent of this policy to establish the level and frequency of monitoring during Fledgling Season and all other times of the year, and document any Take at Applicable Facilities.

APPLICABILITY:

This policy applies to all County facilities with external lights used from dusk to dawn, including the real property on which the facility is situated (“Applicable Facility/Facilities”). This policy applies throughout the year with increased monitoring during the period of time ‘A‘o fledglings leave their nesting sites to head out to sea beginning September 15 and ending December 15 (“Fledgling Season”). The protected seabirds to which this policy applies are:

- ‘A‘o - Newell’s shearwater (*Puffinus newelli*) (listed as threatened)
- ‘Ua‘u - Hawaiian Petrel (*Pterodroma sandwichensis*) (listed as endangered)
- ‘Akē‘akē - Band-rumped Storm Petrel (*Oceanodroma castro*) (listed as endangered)
PROCEDURE:

1. Monitoring.
   
i. Each and every Applicable Facility shall be monitored through visual inspections of the facility exterior including under and around objects and, when the inspection occurs prior to sunrise, with the assistance of a flashlight to ensure comprehensive examination of the property in accordance with this policy.
   
   ii. Each inspection will include a search for downed protected seabirds or carcasses. If any protected seabird is observed at an Applicable Facility, County personnel shall follow the documentation and notification procedures of this policy.
   
   iii. Attachment C provides the strategy, general route of visual inspections to be employed, and likely problem areas of facilities, by category, and is to be used to ensure compliance with this policy.

2. Facility Category and Monitoring Frequency.
   
i. Departments are to refer to Attachment A - County Facility Listing to the KSHCP for the classification of their respective Applicable Facilities.
   
a) All Category 4 and 5 Applicable Facilities will keep at least one rescue kit in the main office consisting of:

   1) Latex or nitrile gloves;
   2) Three towels;
   3) Hand sanitizer;
   4) Flashlight or headlamp;
   5) Clipboard, pen, and blank “Bird Take Field Reports”, or similar; and
   6) Animal safe carrier –medium sized, well ventilated, and marked conspicuously “LIVE ANIMAL.”

   ii. Departments are to refer to Attachment C - Monitoring Plan for illustrations of search areas for respective categories.

   iii. All Applicable Facilities shall be monitored at the frequencies and utilizing the number of facility staff as follows by Category:
a) Category 3 - Limited External Lighting:

   1) Fledgling Season: If a report is received one employee will conduct inspections each morning for at least the first thirty minutes of the employee’s shift of the perimeter and pocket areas of the Applicable Facility.

   2) All other times: If a report is received, one employee will conduct inspections weekly during the first thirty minutes of the employee’s shift of an area up to ten (10) feet around the area where the reported Take occurred.

b) Category 4 - Substantial Exterior Area and Court Lighting:

   1) Fledgling Season: Up to two employees will conduct inspections each morning up to the first hour of the employees’ shift of the perimeter and pocket areas of the Applicable Facility.

   2) All other times: If a report is received, up to two employees will conduct inspections weekly up to the first hour of the employee’s shift of the perimeter and pocket areas of the Applicable Facility.

c) Category 5 - Stadium and Field Lighting:

   1) Fledgling Season: If the Applicable Facility is in use, up to four employees will conduct inspections each morning up to the first hour of the employees’ shift and up to four employees will conduct inspections up to an hour immediately after the Applicable Facility lights are turned off of the perimeter and pocket areas of the Applicable Facility.

   2) All other times: If the Applicable Facility is in use, up to two employees will conduct inspections weekly each morning up to the first hour of the employees’ shift of the perimeter and pocket areas of the Applicable Facility.

iv. Monitoring Personnel

   a) All Departments with an Applicable Facility shall be responsible for ensuring the Applicable Facility has the necessary personnel to conduct the monitoring required by this policy.
b) All Departments with an Applicable Facility shall be responsible for ensuring designated personnel comply with the training, monitoring, and documentation and notice obligations required of this policy.

v. Education and Signage for Facility Users

a) Educational flyers. The County will provide educational flyers to all organizations who use lighted category 3, 4, and 5 facilities. The flyers will inform the users of the possible presence of protected seabirds, the impacts of the use of lights during the fledgling season, and what to do should the users see protected seabirds being impacted by the lights. Please see Attachment B for the sample flyers.

b) Signage. In addition, the County will post signage at all lighted softball fields, basketball courts, and tennis courts, where users are able to manually turn on the lights. The signage will be installed immediately adjacent to the light switches and controllers. The signage will be based on the notices that the County already posts at all lighted facilities during the fledgling season.

3. Documentation and Notification.

i. Immediately upon discovery of a downed (alive) protected seabird, County personnel shall:

a) Use the following rescue procedures:

1) Take the seabird rescue kit and animal safe carrier to the downed seabird;
2) With gloves on and using a towel and approaching from behind, wrap the towel completely around the seabird’s back and wings, being careful to avoid the long, pointed bill;
3) Place the seabird in an animal safe carrier and close;
4) Return the gloves and towel to the rescue kit and return the rescue kit;
5) Keep the animal safe carrier covered and in a quiet, shaded location;
6) Do not feed, water, or handle it (other than to place the seabird in the carrier);
7) County personnel will not attempt to release the seabird;
8) Immediately contact the Kaua‘i Humane Society and Save Our Shearwaters for pickup at 632-0610 or 635-5117.

b) Submit notice of the downed seabird immediately to the KSHCP Coordinator including the following information: date, time, and exact location where found; description of any external lights nearby; species (if known); and condition of the downed seabird. Photographs of the downed seabird and the
of the county attorney

DEREK S. K. KAWAKAMI, MAYOR
MICHAEL A. DAHLIG, MANAGING DIRECTOR

MATTHEW M. BRACKEN
COUNTY ATTORNEY

NICHOLAS R. COURSON
FIRST DEPUTY

OFFICE OF THE COUNTY ATTORNEY
THE COUNTY OF KAUA‘I

www.kauai.gov
4444 Rice Street Suite 220 • Līhu‘e, Hawai‘i 96766 • (808) 241-4930 (b) • (808) 241-6319 (f)
An Equal Opportunity Employer

location it was found at should be taken and provided to the KSHCP Coordinator.

1) Within 24 hours, the KSHCP Coordinator will submit notice via phone, email, or other written form to the USFWS, DLNR, Kaua‘i DOFAW office, SOS, and the Office of the County Attorney including all documentation provided by the County personnel that discovered the downed seabird.

2) Within one week of discovery, the KSHCP Coordinator shall provide USFWS and DLNR Honolulu the completed “KSHCP Downed Seabird Form” and a description of any further actions taken or considered to minimize fallout at the incident location.

ii. Immediately upon discovery of a protected seabird carcass, County personnel shall place the carcass in a ziplock bag and store in a freezer or cool place and contact the DLNR Kauai Seabird HCP Office for collection and shall file a report with the KSHCP Coordinator. The report must include: the date, time, and exact location where the carcass was found; description of any external lights nearby; species (if known); and condition of the downed seabird. Photographs of the carcass and the location it was found at should be taken and provided to the DLNR Kauai Seabird HCP Office and the KSHCP Coordinator.

iii. Each Department shall compile and maintain a monthly log of protected seabirds discovered at their respective Applicable Facilities for each calendar year. No later than December 31 of each calendar year, Departments shall submit their monthly logs covering the calendar year that just ended to the KSHCP Coordinator.

4. Contact Information.

i. KSHCP Coordinator.

a) The KSHCP Coordinator is [NAME], [DEPARTMENT].

b) Reports of Take(s). If a downed seabird is discovered, immediately after following the above rescue procedures, or if a carcass is discovered, the Take(s) are to be reported to the KSHCP Coordinator at (808) [PHONE NUMBER]. All such phone reports will be followed by an email to the KSHCP Coordinator at [EMAIL] with a cc to the Office of the County Attorney at countyattorney@kauai.gov.

ii. Kaua‘i Division of Forestry & Wildlife (DOFAW) Wildlife Management
Staff, as listed below. If the first contact on the priority list is not available, leave a voicemail message, but then call the next person on the contact list. It is essential that person-to-person contact be made with Kaua‘i DOFAW staff – simply leaving a voicemail message is not adequate.

a) **DOFAW** to provide;
b) **DOFAW** to provide.

iii. If the Kaua‘i DOFAW contacts identified above cannot be reached, call Kaua‘i Police Dispatch at 241-1711 and request they contact “Wildlife.”

iv. U.S. Fish and Wildlife Service:

   a. **USFWS** to provide;
   b. **USFWS** to provide.
Attachment A - County Facility Listing to the KSHCP

*Placeholder*
The `a`o (Newell Shearwater) helps Kaua`i’s fishermen find fish at sea and only breeds here in our islands.

KAUAʻI NATIVE SEABIRDS

NEED OUR HELP!

From September 15 through December 15, Kaua`i County asks for your KŌKUA while we strive to perpetuate the lives of our native birds by keeping facility lights TURNED OFF.

If you see birds on the ground, PLEASE KŌKUA, and bring them to the nearest Fire Department Aid Station.

The `ua`u (Hawaiian Petrel) is considered by some to be `aumakua (family guardian).

“Ho`okahi nō hua a ka `a`o”

A message brought to you by

The County of Kauaʻi
The ‘a’o (Newell Shearwater) is the only seabird endemic to Hawai‘i and only breeds here, in our islands.

**Kaua‘i Native Seabirds Need Our Help!**

If you see birds on the ground, PLEASE KOKUA, and bring them to the nearest Fire Department Aid Station.

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“Ho’okahi no hua a ka ‘a’o”
Attachment C - Monitoring Plan

Category 3 Limited External Lighting - Representative facility: Līhu‘e Civic Center

The search strategy employed at Līhu‘e Civic Center will include visual inspection of the perimeter of the facility site and pockets of areas within the facility site as illustrated in the Līhu‘e Civic Center facility sheet below.

The perimeter visual inspection may be performed on foot or using a vehicle. Visual inspection will include searching under any cars parked in the area and under and around ground cover and buildings.

The pockets of areas are likely problem locations due to the proximity of lights and ground cover and buildings which may obstruct visual inspection of the area, as a result, the visual inspections of these areas will be conducted on foot. Visual inspection of these areas will focus on areas near the lighting fixtures and under and around ground cover and buildings.

The perimeter and the pocket area searches will and should overlap to a certain extent to ensure the facility is thoroughly inspected.
Category 4 Substantial Exterior Area & Court Lighting - Representative facility: Kaua‘i War Memorial Convention Hall

The search strategy employed at Kaua‘i War Memorial Convention Hall will include visual inspection of the perimeter of the facility site and pockets of areas within the facility site as illustrated in the Kaua‘i War Memorial Convention Hall facility sheet below.

The perimeter visual inspection may be performed on foot or using a vehicle. Visual inspection will include searching under any cars parked in the area and under and around ground cover and buildings.

The pockets of areas are likely problem locations due to the proximity of lights and ground cover and buildings which may obstruct visual inspection of the area, as a result, the visual inspections of these areas will be conducted on foot. Visual inspection of these areas will focus on areas near the lighting fixtures and under and around ground cover and buildings.

The perimeter and the pocket area searches will and should overlap to a certain extent to ensure the facility is thoroughly inspected.
Category 5 High-Intensity Stadium & Field Lighting - Representative facility: Vidinha Stadium.

The search strategy employed at Vidinha will include visual inspection of the perimeter of the facility site and pockets of areas within the facility site as illustrated in the Vidinha facility sheet below.

The perimeter visual inspection may be performed on foot or using a vehicle. Visual inspection will include searching under any cars parked in the area and under and around ground cover and buildings.

The pockets of areas are likely problem locations due to the proximity of lights and ground cover and buildings which may obstruct visual inspection of the area, as a result, the visual inspections of these areas will be conducted on foot. Visual inspection of these areas will focus on areas near the lighting fixtures and under and around ground cover and buildings.

The perimeter and the pocket area searches will and should overlap to a certain extent to ensure the facility is thoroughly inspected.
Memorandum of Understanding

between

County of Kauai

and

U.S. Fish and Wildlife Service

A. Purpose

The U.S. Fish and Wildlife Service (Service) and County of Kauai (County) (collectively referred to as the “Parties”) have entered into this Memorandum of Understanding (MOU) for the purpose of conserving seabird species listed as endangered or threatened under the Endangered Species Act (ESA).

The County owns and operates football stadium lights. These lights may harm or kill (“take”) the following species in violation of state and federal laws: the endangered band-rumped storm-petrel (Oceanodroma castro) and Hawaiian petrel (Pterodroma sandwichensis), and the threatened Newell’s shearwater (Puffinus auricularis newelli) (hereafter collectively referred to as “seabirds”).

The Kauai Seabird Habitat Conservation Plan (KSHCP) is currently being developed by the State of Hawaii, Department of Land and Natural Resources, Division of Forestry and Wildlife (DLNR-DOFAW). The County proposes to include all of its facilities (including its football stadiums) as covered activities in the KSHCP, and apply for a federal incidental take permit (ITP) and state incidental take license (ITL) to address the anticipated take of seabirds. In the interim, the County would like to work with the Service to address the potential take of seabirds resulting from its stadium lights. This MOU addresses this narrow concern.

B. Legal authority:

The Service enters into this MOU pursuant to legal authority provided by the Fish and Wildlife Coordination Act (16 U.S.C. §661 et seq.) and the Endangered Species Act (16 U.S.C. § 1531 et seq.).

C. Responsibilities of the Parties

1. Responsibilities of the County
a. In the interim period while awaiting completion of the KSHCP, no stadium lighting will be on at any County-operated football facility, including but not limited to Vidinha and Hanapepe, in the evenings between September 15, 2018 and December 15, 2018 except as described below:

i. The following football games of the 2018 season may be scheduled for a time that would require the use of the stadium lights at nighttime, in recognition that the games are early in the fledging season and that shielding of the stadium lighting and/or moon presence in the evening will minimize any anticipated takings: September 21 and September 28. Lighting will be turned off within one hour after the end of each night game.

ii. The following football games of the 2018 season may not be scheduled for a time that would require the use of the stadium lights at nighttime due to the medium to high risk of anticipated taking associated with absence of moon in the evening and/or timing of the fledging season: October 5, October 12, October 19, and October 26.

iii. Football game dates in November 2018 are outside of the regularly scheduled football season, but if a game(s) is held in November it may not be scheduled for a time that would require the use of the stadium lights at nighttime due to the medium to high risk of anticipated taking associated with absence of moon in the evening and/or timing of the fledging season.

b. The County will establish, at its sole cost and expense, an escrow account, no later than November 15, 2018, in the amount of $30,000 to be used in the event that a seabird(s) are found downed for the purpose of mitigating impacts to the seabird(s). If, in the sole judgment of the Service, such an event occurs on either of the September 21 or September 28 dates, for each such event, the County will direct the escrow agent to transfer $15,000 from the escrow account to a qualified entity selected by the County in consultation with, and with approval from, the DLNR-DOFAW for use in mitigating the takings of seabirds on Kauai. The amounts to be spent on mitigation have been set to reflect levels of effort sufficient for the Service to exercise its discretion to agree to the terms of this MOU. Any funds remaining in the escrow account as of January 30, 2019, may be returned to the County. Notwithstanding the above, should the number of such takings equal or exceed two seabirds during the September 21 game, the September 28 game may not occur at night.

c. Whenever lights are on at night at any County-operated football facility between September 15, 2018 and December 15, 2018, the County will monitor the facility grounds. The County will coordinate monitoring with at least four biologists from the DLNR-DOFAW, the Kauai Endangered Seabird Recovery Project, or PIFWO who will assist the County in monitoring seabirds at each of the games. Such monitoring shall include: (1) documentation of number, species, timing, height and flight patterns of observed seabirds; (2) the number of apparently downed seabirds that were searched for and in fact found to be downed; (3) the number of apparently downed seabirds that were searched for and not found; (4) the number of apparently downed seabirds that were not searched for with an explanation of why a search was not conducted; (5) the number of seabirds found downed that did not correspond to an observed apparent downing; and (6) information on the condition of any recovered downed seabirds. Such monitoring will further include, immediately upon conclusion of any game and before the lights
are turned off, a search of the facility grounds for any downed seabirds. For all such monitoring, the County will maintain records of the location, times, dates, and biologists involved, as well as the location, condition, identification, in situ photographs, and fate of each recovered bird. Any seabird encountered during such monitoring will be reported by the County via telephone or email to the Service, Pacific Islands Fish and Wildlife Office (PIFWO) and the Service, Office of Law Enforcement (OLE) within 48 hours. Unless otherwise directed by the OLE, all retrieved seabirds will be transferred to the Save Our Shearwaters program in conformance with recommendations of that program, along with all associated location and photographic data for each bird.

d. Whenever lights are on at night at any County-operated football facility for a publicly attended event, held between September 15, 2018 and December 15, 2018, the County shall ensure that public service announcements regarding seabirds, mutually agreeable and reviewed by PIFWO and OLE, are delivered over the loudspeakers during any such event.

c. The County will complete and provide to PIFWO and OLE, no later than June 1, 2019, a report documenting the results of its monitoring and other observations from the 2018 football season.

2. Responsibilities of the Service

a. By entering into this MOU, the PIFWO is taking an “action” as defined in 50 C.F.R. §402.02. PIFWO will conduct consultation pursuant to Section 7 of the ESA on the provisions of the MOU and, if appropriate, provide an incidental take statement.

b. To the extent possible, PIFWO will continue to provide technical assistance to the County on steps to minimize the impacts of its activities on the seabirds.

3. The Parties Jointly Agree That –

a. The County will comply with the terms of this MOU in good faith, and provide timely notification to the Service of any known or suspected taking ESA-protected seabirds. The Service will conduct consultation on its action pursuant to Section 7 of the ESA, prepare a biological opinion, and exempt incidental take for seabirds as appropriate and only as described in the biological opinion and incidental take statement for the MOU. The County will be responsible for implementing the MOU as described in the biological opinion and incidental take statement for the MOU, including implementation of the mandatory terms and conditions of the incidental take statement.

b. This MOU memorializes the understanding of the parties that, during the interim period while the KSHCP is being actively developed in good faith, the County will minimize and mitigate take of seabirds in accordance with the terms of this MOU.

c. This MOU is unique to the special circumstances presented by this matter and is not intended to be, nor should it be construed as, precedent for any other action by the U.S. Fish and Wildlife Service or the U.S. Department of the Interior of matters of a similar type or subject matter.
D. Administrative Provision

1. Nothing in the MOU may be construed to obligate the Service to any current or future expenditure of funds or resources in advance of the availability of appropriations from Congress, or to expend any funds or resources if they are available.

2. The MOU is effective on the date it is signed by the Service and expires on the date the report documenting the results of the County’s monitoring is received by PIFWO and OLE.

3. Either party may terminate its participation in the MOU with advanced written notice to the other party. Termination will immediately invalidate the ESA section 7 incidental take statement on the MOU.

4. In the event that the County fails to comply with the mandatory terms and conditions contained in the incidental take statement, this MOU will automatically terminate.

5. This MOU is not intended to be a legally enforceable contract in any administrative or judicial body.

6. This MOU is not intended to benefit any third-party, and is not enforceable by any third-party.

Mary Masuura
Service Field Supervisor
13 Sept 2018
Date

County of Kauai
8/28/2018
Date
Kauai Seabird Habitat Conservation Program (KSHCP)

Participant Inclusion Plan (PIP)

Name of Applicant/Participant: Hawaii Department of Transportation (HDOT)

This Participant Inclusion Plan (PIP) template provides a convenient method for non-federal entities to provide the required information to apply for incidental take authorization under the terms of the KSHCP (the Program). Each applicant is required to complete and submit a PIP as part of their application materials in order to apply for an Incidental Take License (ITL) from the State of Hawaii Department of Land and Natural Resources (DLNR) and an Incidental Take Permit (ITP) from the U.S. Fish and Wildlife Service (USFWS) under the KSHCP.

All applicants should consult the KSHCP document for the terms and conditions and the approval process through which the PIP will be evaluated by the DLNR and the USFWS. Staff from the USFWS and the DLNR can provide assistance with completion of this PIP. State of Hawaii DLNR may require fees for this service under the state’s habitat conservation “technical assistance program.”

All capitalized terms used in this PIP are as defined in the KSHCP, unless indicated otherwise.

General Provisions Applicable to this Application.

Neither this PIP, nor the information contained therein, including without limitation all tables, information, data, estimates of take, costs, nor any action taken by the State pursuant to the PIP shall in any way be construed as an admission by the State of any liability, wrongdoing, or violation of law, regulation, contract or policy, or violation of federal, state or local statute or regulation.
Thank you for your interest in the Kauai Seabird HCP.

Instructions: Please complete all items in Part I and II of this form by providing information requested for each item below. Additional pages may be attached to this template as needed to adequately provide the necessary information. Non-federal entities should consult the KSHCP document for items requested in this PIP template and the terms and conditions of the KSHCP (a separate USFWS process is available for federal entities or entities with a federal nexus).

Staff from the DLNR and/or the USFWS may contact the applicant regarding any incomplete information or items needing further clarification. This PIP must be deemed complete before they are able to be processed; incomplete PIP forms will not be processed.

Part 1: Landowner & Property Information; Description of the Facilities; Avoidance & Minimization Measures; Monitoring of Take

Kauai Harbors Item 1. Provide the name of the landowner, business, agency, or institution and complete contact information. If the applicant/participant is different from the landowner, please attach power of attorney (or other documentation) allowing the party to act on the landowner’s behalf.

Participant/Applicant Name: Hawaii Department of Transportation—Harbors Division (HDOT-H)

Physical Address/Location of Facility:
Nawiliwili Harbor
3242 Waapa Road
Lihue, Hawaii 96766

Port Allen Harbor
4300 Waialo Road
Elelele, Hawaii 96705

Mailing Address:
Harbors Administration Kauai District
3242 Waapa Road
Lihue, Hawaii 96766

Primary Contact:
Ownership Name: Director Jade T. Butay
Address:
Hawaii Department of Transportation
Aliiaimoku Hale, 5th Floor, 869 Punchbowl Street
Honolulu, Hawaii 96813
Alternate Contact:
Name: Deputy Director
Address:
Hawaii Department of Transportation
AliiAimoku Hale, 5th Floor, 869 Punchbowl Street
Honolulu, Hawaii 96813

Alternate Contact:
Name: Paul J. Conry, Senior Associate Ecologist
Address:
H. T. Harvey & Associates
745 Fort Street, Suite 2003
Honolulu, Hawaii 96813-3820
Telephone: (808) 441-2081
Email: pconry@harveyecology.com

Lihue Airport Item 1. Provide the name of the landowner, business, agency, or institution and complete contact information. If the applicant/participant is different from the landowner, please attach power of attorney (or other documentation) allowing the party to act on the landowner’s behalf.

Participant/Applicant Name: Hawaii Department of Transportation—Airports Division (HDOT-A)

Physical Address/Location of Facility:
Lihue Airport
3901 Mokulele Loop #6
Lihue, Hawaii

Mailing Address:
Lihue Airport
3901 Mokulele Loop #6
Lihue, Hi 96766
Kauai Harbors Item 2. Provide the legal description of the property at which the existing facilities and Covered Activities are located, including Tax Map Key (TMK) number. Provide a survey of the property and site plan drawings showing the locations of the Covered Activities (lights), property boundaries, buildings & structures, and site features. If properties containing the Covered Activities comprise separate parcels please include all Tax Map Key numbers and maps.

Nawiliwili Harbor: Portions of Tax Map Key plats (4) 3-2-03, and (4) 3-2-04. A list of the Nawiliwili Harbor TMK parcels being covered under this HCP are detailed in Kauai Harbors Table 1. The boundary of Nawiliwili Harbor is shown in Kauai Harbors Figure 1.

Port Allen Harbor: Portion of Tax Map Key plat (4) 2-1-03. The boundary of Port Allen Harbor is shown in Kauai Harbors Figure 2. The Port Allen Harbor TMK parcels being covered under this HCP are listed below and shown in Kauai Harbors Figure 2.

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An aerial view of Nawiliwili Harbor, the location of buildings and structures with exterior lights that are covered by the HCP, and other site features of the property, are provided in Kauai Harbors Figure 3.

An aerial view of Port Allen Harbor, the location of buildings and structures with exterior lights that are covered by the HCP, and other site features of the property, are provided in Kauai Harbors Figure 4.
Kauai Harbors Table 1. A List of the Nawiliwili Harbor Tax Map Key Parcels Being Covered under the KSHCP and Referenced in Kauai Harbors Figure 1

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</table>
Kauai Harbors Figure 2. Port Allen Harbor Tax Map Key Boundaries
Kauai Harbors Figure 3. Aerial View of Nawiliwili Harbor Showing the Location Buildings and Harbor Facilities with Exterior Lighting
Kauai Harbors Figure 4. Aerial View of Port Allen Harbor Showing the Location of Buildings and Harbor Facilities with Exterior Lighting
Lihue Airport Item 2. Provide the legal description of the property at which the existing facilities and Covered Activities are located, including Tax Map Key (TMK) number. Provide a survey of the property and site plan drawings showing the locations of the Covered Activities (lights), property boundaries, buildings & structures, and site features. If properties containing the Covered Activities comprise separate parcels please include all Tax Map Key numbers and maps.

See Lihue Airport Figures 1 and 2, depicting the Lihue Airport (915 Acres, 1.5 miles east of Lihue, 153 feet above mean sea level):

_____ Portion of Tax Map Key plat (4) 3-5-01. The Lihue Airport TMK parcels being covered under this HCP are listed below and shown in Lihue Airport Figure 1. The boundary of Port Allen Harbor is shown in Kauai Harbors Figure 2.

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</table>

_____ Lihue Airport survey map (Lihue Airport Figure 1)
_____ Map of property (airport layout plan) (Lihue Airport Figure 2)

An aerial view of Lihue Airport, the location of buildings and structures with exterior lights that are covered by the HCP other site features of the property, are provided in Lihue Airport Figure 2.
Lihue Airport Figure 1. Lihue Airport Tax Map Key Parcels
Lihue Airport Figure 2. Lihue Airport Boundary and Location of Facilities with Outdoor Lighting.
Kauai Harbors Item 3. Describe the existing Covered Activities for which incidental take authorization is sought. Include list of buildings, type and description of lights present, purpose and location of lights and current seabird lighting accommodation in place (e.g. shielding, downward pointing, switched off during fledging season, etc.). For “Types of lights” please use the following categories:

- Parking Lights
- Signage Illumination
- Wall-pack Building Lights
- Landscaping/Grounds/Accent/Bollards
- Indoor lights visible from outdoors
- Roof Floodlights
- High-mast Lights
- Other Lights

Facility lighting plan may be submitted as lighting inventory. Photos may be attached. The suggested light table and Green Sea Turtle assessment table below may each be modified as needed to provide the necessary information.

Kauai is served by two deep-draft commercial harbors, Nawiliwili Harbor and Port Allen Harbor. A general description of each is provided below. For its lawful land, water, and ocean use activities, HDOT is applying for an ITP under the KSHCP for the Newell’s shearwater (*Puffinus newelli*), Hawaiian petrel (*Pterodroma sandwichensis*), and band-rumped storm petrel (*Oceanodroma castro*).

**Nawiliwili Harbor**

Nawiliwili Harbor is owned and operated by the State of Hawaii and is the island’s primary commercial and transportation center, located 1 mile from the county seat in Lihue. It is located on the southeast coast of Kauai and is just 4 miles from Lihue Airport, with easy access to the island’s highway system through Waapa Road. Facilities include piers for the handling of both overseas and interisland containerized and general cargo, as well as cruise ship passengers and crews.

Nawiliwili Harbor is a human-made port, dredged from naturally formed Nawiliwili Bay. The ocean frontage consists of concrete piers or large rock and boulder fill. The existing harbor facilities include three piers providing over 1,800 feet of berthing space:

- Piers 1 and 2 together are 1,214 feet long with a depth of 34 feet at pier side.
- Pier 3, completed in 1994, is 635 feet long and contains over 16 acres of paved yard.

In addition, construction of a segmented pier approximately 100 feet long was completed in 2008.

The harbor basin is 1,540 feet wide by 1,950 feet long and is protected by a rock-faced jetty and a 2,150-foot-long breakwater. Kauai Harbors Table 2 and Kauai Harbors Figure 3 provides details of the existing facilities and external lighting, which is mandated for security and safety reasons for lawful operational activities at Nawiliwili Harbor. Lighting is important especially during twilight hours and from sunset to sunrise to protect this critical infrastructure, in compliance with federal requirements.
Adjacent to the commercial harbor is the Nawiliwili Small Boat Harbor, managed by DLNR’s Division of Boating and Ocean Recreation. Nawiliwili Harbor does not have any beach area along its ocean frontage; the nearest beach area is at Nawiliwili Park and Kalapaki Beach, fronting the Kauai Marriott Beach Resort more than 900 feet from the property. The beach is 980 feet from the closest light feature at the harbor.

Nawiliwili Harbor and its operational and administrative activities are regulated by the U.S. Coast Guard (USCG) and Customs and Border Protection (CBP), U.S. Department of Homeland Security (DHS), Occupational Safety and Health Administration (OSHA), and the U.S. Department of Labor. Additionally, the portions of the harbor behind security fencing are designated and regulated by the CBP as “secured or sterile” (restricted) areas. These designated and restricted areas are accessible only by individuals who successfully complete a stringent Security Threat Assessment and Criminal History Security Check and who are issued a Transportation Worker Identification Card, which must be visibly displayed on their persons at all times. Entry by unauthorized individuals into these restricted areas is a federal violation. Containerized imported cargo must be inspected by CBP, and imported and exported products are inspected by the Hawaii Department of Agriculture. HDOT-H provides 24-hour security for the facilities through a contract with a private security services firm. On behalf of HDOT-H, each contracted private security officer must be qualified and certified to conduct their security duties at the facility as well as to successfully complete a Security Threat Assessment and Criminal History Security Check. Restricted areas are surrounded by a security fence, which serves to restrict access by unauthorized individuals, but also controls access by feral dogs or cats that may opportunistically prey on downed seabirds. All security requirements imposed on Nawiliwili Harbor are mandated under a Facility Security Plan (FSP), which is co-approved by a representative of the USCG and a designated official of Nawiliwili Harbor. The contents of the FSP are classified as Security Sensitive Information (SSI) and can be reviewed only “on an as needed basis” and released with proper written authorization.

Nawiliwili Harbor is the island’s primary port of call, through which most maritime cargo is imported and through which island products are exported. All of Kauai’s containerized cargo is received here and the harbor is the preferred destination for cruise ships, limited to vessels with lengths not exceeding 1000 feet. In addition to cruise ship passengers the harbor handles commodities including darkened molasses; construction materials such as lumber, rebar, and cement; petroleum products such as gasoline; jet fuel and liquefied natural gas and propane; and scrap metal.

Nawiliwili Harbor has regularly scheduled cargo services by Matson, Inc. and Young Brothers, Limited shipping lines. Matson Inc. has weekly tug and barge service to Nawiliwili on Friday and Sunday, operating out of Pier 2. Matson vessels typically operate during day light hours and are in port from 7:00 am – 2:00 pm on Friday and 7:00 am – 3:00 pm on Sundays. Night operational lighting is typically not used unless departure is delayed for some reason.

Young Brothers has weekly tug and barge cargo service to Nawiliwili Harbor on Tuesday and Friday, operating out of Pier 3. Young Brothers tug and barge vessels typically arrive in the morning and depart later that same day after dark. The vessels are usually in port until 8:00 – 10:00 pm requiring full operational night lighting when vessels are actively loading and unloading with heavy equipment operators present.
The cruise ship Pride of America is the other vessel that makes regularly scheduled overnight visits to Nawiliwili Harbor, operating out of Pier 2. It arrives at 7:00 am on Thursday and departs at 2:00 pm on Friday. It requires night operational lights while in port, but Pier 2 has a reduced amount of lighting with three high-mast poles illuminating the pier. Only those portions of Pier 2 where lighting is needed for passenger access and safety are illuminated with night operational lights.

Nawiliwili is considered a daylight port for large vessels such as cruise ships, fuel tankers, and propane vessels which typically enter and leave port in a single day during daylight hours. Container cargo operations, such as Matson and Young Brothers, arrive by tug and barges and are not limited by daylight port only operations. The fuel tanker stays overnight, but does not require port side operational lights during these periods. Large cruise ships that do visit typically do so in a single day and do not stay overnight, but may not depart port until after dark, requiring elevated lighting levels to support those operations.

Port Allen Harbor

Port Allen Harbor is Kauai’s second commercial harbor, located on the south coast of the island, 20 miles from Lihue Airport and 106 nautical miles from Honolulu Harbor. Port Allen Harbor is nestled in the naturally formed Hanapepe Bay. The Hanapepe River flows into the bay, but because much of the water has been diverted for irrigation purposes, sediments deposited by the river are minimal. The bay is surrounded by the old plantation communities of Hanapepe and Elele to the north. Waialo Road provides access to the harbor from Kaumualii Highway. The dimension of the harbor basin is 1,200 feet by 1,500 feet and is protected by a 1,200-foot breakwater. The entrance channel is 500 feet wide with a depth of 35 feet. Adjacent to the commercial harbor is the Port Allen Small Boat Harbor managed by the DLNR Division of Boating and Ocean Recreation.

Port Allen Harbor is a smaller facility that serves the military, petroleum suppliers, and more recently, small charter and excursion boat operators. The harbor facilities include two 600-foot-long piers located on opposite sides of the primary pier structure. The north pier has a depth of 25 feet, while the south pier has a depth of 35 feet. The U.S. Navy Pacific Missile Range Facility (PMRF) leases the north pier berths, while the south pier berths are used by charters and excursion operators. Port Allen has facilities for liquid bulk (e.g., petroleum) cargo. There are roughly 1.5 acres of shed and open storage space at the facility. The north side of the pier used by PMRF has security fencing across the pier entrance and at the end of the PMRF-leased space. Port Allen is not regulated by a USCG FSP.

Port Allen Harbor is considered a daylight port and does not have high-mast lights to illuminate large vessel night operations. The regularly scheduled service by a large vessel is the fuel barge that visits every other Monday. The vessel arrives at first light and departs by 3:00 pm. The smaller sized charter and excursion operators use the pier in the early evening and at night, to service their boats. The south side of the facility is not fenced and is open to public access. The pier is a popular fishing spot and heavily used by the public for night fishing. The harbor is staffed by a harbor agent during the day, Monday - Friday and is unmanned on weekends and at night. Night lighting for facility security is on a timer and comes on at dusk and stays on overnight. The night lighting is limited to every other light along the Pier Shed. Tenants also provide their own external lighting to illuminate their work areas.
Kauai Harbors Figures 3 and 4 above show the location of buildings and features at Nawiliwili Harbor and Port Allen Harbor. Kauai Harbors Tables 2 and 3 below describe the type of lights at the building locations shown in these figures, their purpose, and measures implemented to avoid or minimize take impacts to Covered Species. Appendix A provides information on the specifications of the various types of lights used at each facility.
### Kauai Harbors Table 2. Outdoor Lighting at Nawiliwili Harbor

<table>
<thead>
<tr>
<th>List of Buildings/ Facilities</th>
<th>Type/Description of Lights Present</th>
<th>Location</th>
<th>Purpose of the Lights</th>
<th>Describe any measures implemented to avoid or minimize take impacts to Covered Species</th>
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<tbody>
<tr>
<td>Harbor Yard</td>
<td>LED High-mast Lighting, Pole mounted at 82 ft high, 4000K, Dimmable (Holophane HMLED2 12 4K)</td>
<td>Paved container yard supporting Piers 1, 2, and 3</td>
<td>To provide operational safety and port security for yard operations, dock operations, yard storage, and yard parking areas</td>
<td>With the 2016 energy-savings program, high-pressure sodium light fixtures were replaced with downward pointed, full cut-off LED light fixtures. High-mast light fixtures are compliant with night sky protection strategy under HRS Section 201-8.5. Further, lights are dimmed when no pier operations are in progress.</td>
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<td>Harbor Yard Roadways</td>
<td>LED High-mast Lighting, Pole mounted at 28-44 ft high, 4000K, (Holophane HMLED2 06 4K)</td>
<td>Internal roadway between Piers 2 and 3</td>
<td>To provide operational safety and port security for internal yard roadway</td>
<td>With the 2016 energy-savings program, high-pressure sodium light fixtures were replaced with downward pointed, full cut-off LED light fixtures. Street light fixtures are compliant with night sky protection strategy under HRS Section 201-8.5. Downward pointed, full cut-off fixtures are compliant with night sky protection strategy under HRS Section 201-8.5.</td>
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<td>LED Roadway Lighting, D series area luminaire, Pole mounted at 30 ft high, 4000K, (Lithonia DSX0 LED 20C 1000 40K)</td>
<td>Paved roadway off Waapa Road to Young Brothers entry gate to Pier 3.</td>
<td>To provide operational safety and port security for access roadway off Waapa Road</td>
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<tr>
<td>Harbor Administration Building</td>
<td>LED Wall-pack Building Lights, 4000K. (RAB WPLED13N/PC2)</td>
<td>Harbor Administration Offices Compound</td>
<td>To provide operational safety and security for harbor administrative office compound</td>
<td>Downward pointed, full cut-off fixture, all wall-pack building lights are mounted under eaves and are compliant with night sky protection strategy under HRS Section 201-8.5. Downward pointed, full cut-off fixture, all wall-pack building lights are mounted under eaves and are compliant with night sky protection strategy under HRS Section 201-8.5. Downward pointed, full cut-off fixture, all wall-pack building lights are mounted under eaves and are compliant with night sky protection strategy under HRS Section 201-8.5.</td>
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<td>LED Recessed Ceiling Mount Downlight Building Lights, 4000K, (Precision RF6LED5G4-277)</td>
<td>Harbor Administration Offices Compound</td>
<td>To provide operational safety and security for harbor administrative office compound</td>
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<td>LED Ceiling Mount Canopy Downlight Building Lights, 4000K, (Cree CPY250-A-DM-F-C-UL-SV-PML)</td>
<td>Harbor Administration Offices Compound</td>
<td>To provide operational safety and security for harbor administrative office compound</td>
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<tr>
<td>List of Buildings/ Facilities</td>
<td>Type/Description of Lights Present</td>
<td>Location</td>
<td>Purpose of the Lights</td>
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<tr>
<td>Harbor Maintenance Baseyard Buildings</td>
<td>LED Wall-pack Building Lights, 4000K, (RAB WPLED13N/PC2)</td>
<td>Harbor Administration Compound</td>
<td>To provide operational safety and security for harbor administrative office compound</td>
<td>Downward pointed, full cut-off fixture, all wall-pack building lights are mounted under eaves and are compliant with night sky protection strategy under HRS Section 201-8.5.</td>
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<tr>
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<td>LED Flood Light Fixture – Flood or shoebox mount, LED, 4000K, (Holophane PMLED-03-4K)</td>
<td>Harbor Administration Compound</td>
<td>To provide operational safety and security for harbor administrative office compound</td>
<td>Downward pointed, full cut-off function achieved by aiming angle, all wall-pack building lights are mounted under eaves and are compliant with night sky protection strategy under HRS Section 201-8.5.</td>
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<td>LED Ceiling/wall mount Florescent Strip Fixture; 4000K, (Precision SIL-1X8-XL-F-UL-40K-CW8-JP)</td>
<td>Harbor Administration Compound</td>
<td>To provide operational safety and security for harbor administrative office compound</td>
<td>Downward pointed, full cut-off fixture, all ceiling/wall-pack building lights are mounted under eaves and are compliant with night sky protection strategy under HRS Section 201-8.5.</td>
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<td>Warehouse Pier 2 Building (occupied by Matson)</td>
<td>LED Wall-pack Building Lights, 4000K, dusk to dawn timer. (RAB WPLED3T78NW/PC2)</td>
<td>Pier 2</td>
<td>To provide operational safety and security for Matson processing and storage facilities.</td>
<td>Downward pointed, full cut-off fixture, all wall-pack building lights are mounted under eaves and are compliant with night sky protection strategy under HRS Section 201-8.5.</td>
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<td>LED Flood Light Fixture, Flood or shoebox mount, 4000K, (Holophane PMLED-04-4K)</td>
<td>Pier 2</td>
<td>To provide operational safety and security for Matson processing and storage facilities</td>
<td>Downward pointed, full cut-off function achieved by aiming angle, all wall-pack building lights are mounted under eaves and are compliant with night sky protection strategy under HRS Section 201-8.5.</td>
</tr>
<tr>
<td>Warehouse Pier 3 Building (occupied by Young Brothers)</td>
<td>LED High Bay Fixture, ceiling mounted high bay, 4 LED modules, 4000K, (Cree PKG-304-5M-DM-04)</td>
<td>Pier 3</td>
<td>To provide operational safety and security for Young Brothers processing and storage facilities</td>
<td>Downward pointed, full cut-off fixture, all ceiling/wall-pack building lights are mounted under eaves and are compliant with night sky protection strategy under HRS Section 201-8.5.</td>
</tr>
<tr>
<td>List of Buildings</td>
<td>Type/Description of Lights Present</td>
<td>Location</td>
<td>Purpose of the Lights</td>
<td>Describe any measures implemented to avoid or minimize take impacts to Covered Species</td>
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<tr>
<td>Port Allen South Pier Shed Buildings</td>
<td>LED Wall-pack Building Lights, 4000K, dusk to dawn timer (RAB WPLED13N/PC2, RAB WPLED18N/PC2, RAB WPLED26N/PC2)</td>
<td>South Pier Shed Berths Walls</td>
<td>To provide operational safety and security for harbor offices, tenants, and the public</td>
<td>Downward pointed, full cut-off fixture, all wall-pack building lights are mounted under eaves, night time setting of every other light turned off and are compliant with night sky protection strategy under HRS Section 201-8.5.</td>
</tr>
<tr>
<td>Port Allen South Pier Shed Buildings</td>
<td>LED Flood Light Fixture, Flood mount, 4000K (Holopane PMLED-03-4K, Holopane PMLED-04-4K)</td>
<td>South Pier Shed Walkway, Berth Walls</td>
<td>To provide operational safety and security for harbor offices, tenants, and the public</td>
<td>Downward pointed, full cut-off function achieved by aiming angle, all wall-pack building lights are mounted under eaves, turned off when no operations in progress and are compliant with night sky protection strategy under HRS Section 201-8.5.</td>
</tr>
<tr>
<td>Port Allen South Pier Shed Parking Lot</td>
<td>LED Flood Light Fixture, Flood mount on side of building, 4000K (Holopane PMLED-03-4K, Holopane PMLED-04-4K)</td>
<td>South Pier Shed East End Parking Lot</td>
<td>To provide operational safety and security for harbor offices, tenants, and the public</td>
<td>Downward pointed, full cut-off function achieved by aiming angle and are compliant with night sky protection strategy under HRS Section 201-8.5.</td>
</tr>
<tr>
<td>Port Allen South Pier Parking Lot Storage Shed</td>
<td>LED Flood Light Fixture, Flood mount, 4000K (Holopane PMLED-03-4K, Holopane PMLED-04-4K)</td>
<td>South Pier Storage Building at back of Parking Lot</td>
<td>To provide operational safety and security for harbor offices, tenants, and the public</td>
<td>Downward pointed, full cut-off function achieved by aiming angle, wall-pack building light mounted under eaves.</td>
</tr>
<tr>
<td>Port Allen North Pier Shed Buildings</td>
<td>LED Wall-pack Building Lights, 4000K</td>
<td>North Pier Shed</td>
<td>To provide operational safety and security for U.S. Navy PMRF pier facilities</td>
<td>The lights that illuminate the northern berths are controlled by the U.S. Navy PMRF. Any measures taken to minimize take impacts are the responsibility of the U.S. Navy PMRF.</td>
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<tr>
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<td>LED Flood Light Fixture, Flood mount, 4000K</td>
<td>North Pier Shed</td>
<td>To provide operational safety and security for U.S. Navy PMRF pier facilities</td>
<td>The lights that illuminate the northern berths are controlled by the U.S. Navy PMRF. Any measures taken to minimize take impacts are the responsibility of the U.S. Navy PMRF.</td>
</tr>
</tbody>
</table>
Kauai Harbors Table 4. Green Sea Turtle (Honu) Assessment for the Site and Facility

Please provide the information requested below for each facility, parcel, and site to help determine if potential exists for take (pages may be attached). If potential exists for take of the green sea turtle, measures to avoid impacts to the honu from the effects of light attraction may be required. Please consult with staff from the DLNR and the USFWS to arrange a site visit, if needed, discuss measures to avoid impacts to the honu, and provide further guidance.

<table>
<thead>
<tr>
<th>Are any of the facilities located adjacent to a beach?</th>
<th>Yes / No</th>
<th>If yes, provide length of beach frontage &amp; brief description of facilities &amp; lights adjacent to the beach</th>
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<tbody>
<tr>
<td>Nawiliwili Harbor</td>
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<tr>
<td>Port Allen Harbor</td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Are any of the Covered Activities (lights) visible from a beach?</th>
<th>Yes / No</th>
<th>If yes, describe the specific lights (type, quantity, height, purpose) &amp; specific location; provide map &amp; photos showing distance from beach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nawiliwili Harbor</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Port Allen Harbor</td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Have green sea turtles been known to nest on any beaches adjacent to the facilities?</th>
<th>Yes / No</th>
<th>If yes, provide information about nesting occurrences, if known, including location and date and any other information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nawiliwili Harbor</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Port Allen Harbor</td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>
Lihue Airport Item 3. Describe the existing Covered Activities for which incidental take authorization is sought. Include list of buildings, type and description of lights present, purpose and location of lights and current seabird lighting accommodation in place (e.g. shielding, downward pointing, switched off during fledging season, etc.). For “Types of lights” please use the following categories:

- Parking Lights
- Signage Illumination
- Wall-pack Building Lights
- Landscaping/Grounds/Accent/Bollards
- Indoor lights visible from outdoors
- Roof Floodlights
- Other Lights

Facility lighting plan may be submitted as lighting inventory. Photos may be attached. The suggested light table and green sea turtle assessment table below may each be modified as needed to provide the necessary information.

Lihue Airport

Lihue Airport is part of a statewide system that includes most of the major air carrier and general aviation airports in the Hawaiian Islands. It is part of the Kauai Island District.

Lihue Airport is classified by the FAA as a Class 1 Airport, certified to serve scheduled and unscheduled operations of large air carrier aircraft. In order to serve air carrier operations, Lihue Airport is required to have 14 CFR Part 139 Airport Certification and hold a Part 139 Air Operating Certificate issued by the FAA, to ensure safety in air transportation. To obtain a certificate, an airport must agree to certain operational and safety standards, including having Part 139 compliant runway/taxiway and apron lighting and signage, lighting, and obstruction lighting. Lihue Airport is also governed by the provisions of Chapters 261, 262, and 263 of the Hawaii Revised Statutes. HDOT-A has compiled and published “Administrative Rules for Public Airports” (Title 19), promulgating rules and regulations for operation of the Airports Division (HDOT-A) and the individual airports throughout the state.

Lihue Airport occupies 915 acres and is situated about 1.5 miles east of Lihue, on the southeast coast of the island of Kauai. The airport promotes the freedom of movement of passengers and commerce and provides passenger and aircraft facilities for domestic overseas carriers, interisland carriers, commuter/air taxis, air cargo, and general aviation activities. Airfield facilities include two runways (6,500 by 150 feet), taxiways, aprons, eight gates, navigational aids (ILS, VORTAC, DME, and PAPI/VASI), an airport traffic control tower, and helipads.

Vehicular access to the airport is provided by Ahukini Road, which extends from Kapule Highway. The passenger terminal is served by a one-way loop roadway branching off Ahukini Road and encircling a public parking lot. The remaining facilities are served directly by Ahukini Road.

Airport support elements include the Federal Aviation Administration (FAA) air traffic control tower, aircraft rescue and firefighting facilities, National Weather Service office and balloon launch facility,
HDOT-A Airport Maintenance facilities, fuel storage and loading facilities, concessions (food and beverage, retail, Wifi, rental cars) and airport service roads.

Airspace usage in the Lihue terminal area is influenced by urban development, resort and recreational areas (golf course), military activities, and terrain features. Some of these activities and operations may attract avian activity, but must comply with safety, security, and health regulations, some limit the use of airspace, and some do both.

There are currently no restrictions that influence aircraft performance on approaches or departures. The control tower advises arriving and departing aircraft to minimize overflights of the town of Lihue to the southwest. With respect to approach procedures, air traffic from the north must maintain an altitude of 1,500 feet until final approach.

Lihue Airport Figure 1 above shows the TMK parcels that compose the airport property. Lihue Airport Figure 2 above uses Google Earth imagery to show the landscape-scale features of Lihue Airport and identifies those buildings and features that have outdoor lights. Lihue Airport Table 1 describes the outdoor airport lighting. Appendix A provides information on the specifications of the various types of lights used at the facility.
<table>
<thead>
<tr>
<th>List of Buildings/Facilities</th>
<th>Type/Description of Lights Present</th>
<th>Location</th>
<th>Purpose of the Lights</th>
<th>Describe any measures implemented to avoid or minimize take impacts to Covered Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Ramp/Apron (Aircraft Operating Area)</td>
<td>HPS High-mast Lighting, Pole-Mounted Flood Fixture, High Pressure Sodium, (6) 1000W lamps, on timer from dusk to 12:30 a.m.</td>
<td>The aircraft apron, ramp and taxiways servicing the main passenger terminal.</td>
<td>To provide operational safety and security for aircraft movement, servicing, maintenance, baggage handling, and passenger service</td>
<td>Downward pointed, full cut-off function achieved by aiming angle, turned off at 12:30 am after the last flight departs for the night.</td>
</tr>
<tr>
<td></td>
<td>HPS Apron Flood Lighting, Pole-Mounted Flood Fixture, High Pressure Sodium, (4) 1000W lamps</td>
<td></td>
<td></td>
<td>Downward pointed, full cut-off function achieved by aiming angle, turned off at 12:30 am after departure of the last flight.</td>
</tr>
<tr>
<td></td>
<td>LED Wall-pack Building Lights, 4000K, (Cree SEC EDG 3MB WM 04 D 40k)</td>
<td></td>
<td></td>
<td>Downward pointed, full cut-off fixture.</td>
</tr>
<tr>
<td></td>
<td>LED Ceiling Mount, Recessed Can, 4000K, (Precolite RLF6LEDG4 6LLED7G4-40k)</td>
<td></td>
<td></td>
<td>Downward pointed, full cut-off fixture.</td>
</tr>
<tr>
<td></td>
<td>LED Ceiling Mount, High Bay Canopy Light, 4300K, (Cree CAN EDG 5S DM 04 43K)</td>
<td></td>
<td></td>
<td>Downward pointed, full cut-off fixture.</td>
</tr>
<tr>
<td>Terminal Building (Public Access)</td>
<td>LED Wall-pack Building Lights, 4000K, (Cree SEC EDG 3MB WM 04 D 40k)</td>
<td>Main terminal public access areas, vehicle and pedestrian access</td>
<td>To provide operational safety and security for public, airport workers, and tenants.</td>
<td>Downward pointed, full cut-off fixture.</td>
</tr>
<tr>
<td></td>
<td>LED Ceiling Mount, Recessed Can, 4000K, (Precolite RLF6LEDG4 6LLED7G4-40k)</td>
<td></td>
<td></td>
<td>Downward pointed, full cut-off fixture.</td>
</tr>
<tr>
<td></td>
<td>LED Ceiling Mount, High Bay Canopy Light, 4300K, (Cree CAN EDG 5S DM 04 43K)</td>
<td></td>
<td></td>
<td>Downward pointed, full cut-off fixture.</td>
</tr>
<tr>
<td>Terminal Building (Public Access Indoor Lighting)</td>
<td>LED Interior Indoor Lights Visible from Outside. LED Fluorescent Light. On motion sensor to dim to 10% level when not occupied.</td>
<td>Main terminal public access passenger holding areas, pedestrian access</td>
<td>To provide operational safety and security for public, airport workers, and tenants.</td>
<td>Internal building lighting, passenger holding areas on motion sensor to dim to 10% level when not occupied.</td>
</tr>
<tr>
<td>List of Buildings/Facilities</td>
<td>Type/Description of Lights Present</td>
<td>Location</td>
<td>Purpose of the Lights</td>
<td>Describe any measures implemented to avoid or minimize take impacts to Covered Species</td>
</tr>
<tr>
<td>-----------------------------</td>
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<td>-----------------------------------------------</td>
</tr>
<tr>
<td>Public Parking Lot</td>
<td>LED Pole Mounted Parking Lot Light, 4000K, Solar Powered dusk to dawn timer. Holophane - ATB2 40BLEDE70 120 R2 GY NR DCDRIVER &amp; EG-340 LED Bollard Walkway light, 3 ft high, 5500K, Solar Powered dusk to dawn timer. First Light PLB 102 BZ SYM 55K 04 SEC</td>
<td>Public Car Park</td>
<td>To provide public safety and security for visitors to airport and enable surveillance of parking areas to maintain airport security.</td>
<td>Downward pointed, full cut-off fixture</td>
</tr>
<tr>
<td>Rental Car Lots (public access road)</td>
<td>LED Roadway Light, LED Pole Mounted, 4000K, Solar Powered dusk to dawn timer. (Holophane - ATB2 40BLEDE70 120 R2 GY NR DCDRIVER &amp; EG-340)</td>
<td>Rental car facilities access road</td>
<td>To provide safe driving, walking and working conditions for public, workers, and businesses.</td>
<td>Downward pointed, full cut-off fixture.</td>
</tr>
<tr>
<td>Ahukini Road</td>
<td>LED Roadway Light, LED Pole Mounted, 4000K, Solar Powered dusk to dawn timer. (Holophane - ATB2 40BLEDE70 120 R2, R4, R5 GY NR DCDRIVER &amp; EG-340) LED Sign Illumination, flood solar light, 2-light system, 2700K, dimmable. (Solar Illuminations FL57 2 lamp system 45W Panel)</td>
<td>Airport access road to main terminal, cargo and commuter terminal, and heliport</td>
<td>To provide safe driving, walking and working conditions for the public, airport workers, and tenants</td>
<td>Mounted above sign. Downward pointed</td>
</tr>
<tr>
<td>Cargo Ramp/Apron (Aircraft Operating Area)</td>
<td>HPS High-mast Lighting, Pole-Mounted Flood Fixture, High Pressure Sodium, (6) 1000W lamps</td>
<td>Aircraft apron, parking stalls, and taxiways for the main terminal</td>
<td>To provide operational safety and security for aircraft movement, servicing, and maintenance, baggage handling for passenger service.</td>
<td>Downward pointed, full cut-off function achieved by aiming angle.</td>
</tr>
<tr>
<td></td>
<td>HPS Apron Flood Lighting, Pole-Mounted Flood Fixture, High Pressure Sodium, (4) 1000W lamps</td>
<td></td>
<td></td>
<td>Downward pointed, full cut-off function achieved by aiming angle.</td>
</tr>
<tr>
<td></td>
<td>MH Metal Halide Lighting, Pole-Mounted Flood Fixture, Metal Halide, (4) 750W lamps, Magnetic ballast</td>
<td></td>
<td></td>
<td>Downward pointed, full cut-off function achieved by aiming angle.</td>
</tr>
<tr>
<td>List of Buildings/ Facilities</td>
<td>Type/Description of Lights Present</td>
<td>Location</td>
<td>Purpose of the Lights</td>
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</tr>
<tr>
<td>------------------------------</td>
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<td>----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Commuter Terminal and Cargo Building (Public Access)</td>
<td>LED Wall-pack Building Lights, 4000K, (Cree SEC EDG 3MB WM 04 D 40k) LED Wall-pack Building Lights, 4000K, (RAB WPLED18N) LED Ceiling Mount, Recessed Can, 4000K, (Precolite RLF6LEDG4 6LILED7G4-40k) LED Pole mounted shoebox area light, 4000K (Cree ARE EDG 3M DA 04 E 40K)</td>
<td>Cargo and Commuter terminal public access areas, vehicle and pedestrian access</td>
<td>To provide operational safety and security for public, airport workers, and tenants and handling of cargo.</td>
<td>Downward pointed, full cut-off fixture</td>
</tr>
<tr>
<td>Heliport Apron (Aircraft Operating Area, T-hangers)</td>
<td>LED Wall-pack Building Lights, 4000K, (RAB WPLED13N) LED Area Flood Light, wall mounted, 4000K, (Cree ARE EDG 4M DA 10 E UL BZ 525 40K PML + WM2) LED Area Flood Light, pole mounted, 4000K, (Cree ARE EDG 4M DA 10 E UL BZ 525 40K PML + WM2) LED Area light, wall mounted, 4000K (Cree ARE EDG 4M AA 04 E UL BZ 700 40K R + WM-2) LED Area Light, pole mounted shoebox fixture, 4000K, (Cree ARE EDG 3M DA 04 E UL BZ 525 R) LED Roadway Light, LED Pole Mounted, 4000K, Solar Powered dusk to dawn timer. (Holophane - ATB2 40BLED70 120 R2 GY NR DCDRIVER &amp; EG-340)</td>
<td>Helicopter apron, T-Hangers, and service area within secure part of airport.</td>
<td>To provide safety and security for aircraft movement, servicing, and maintenance.</td>
<td>Downward pointed, full cut-off fixture, turned off when no operations are in progress. Downward pointed, full cut-off fixture, turned off when no operations are in progress. Downward pointed, full cut-off fixture, turned off when no operations are in progress. Downward pointed, full cut-off fixture, turned off when no operations are in progress. Downward pointed, full cut-off fixture.</td>
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<td>-----------------------------</td>
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<td>----------</td>
<td>-----------------------</td>
<td>-----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Fire Department</td>
<td>LED Flood light, Wall mounted, 4000K (Cree FLD EDG 70 AA 04 D UL BZ 525) LED Wall-pack Building Lights, 4000K, (Cree SEC EDG 3MB WM 04 D 40k) LED Area Light, Pole mounted, 4000K, (Cree ARE EDG 3M DA 06 D UL BZZ 700 40K P) LED Ceiling Mount, Recessed Can, 4000K, Dimmable (Precolite RLF6LEDG4 6LFLLED7G4-40k)</td>
<td>Airport airfield adjacent to runways</td>
<td>To provide operational safety and security for airport fire station, worker safety and facility security</td>
<td>Downward pointed, full cut-off function achieved by aiming angle</td>
</tr>
</tbody>
</table>

DRAFT
Lihue Airport Table 2. Green Sea Turtle (Honu) Assessment for the Site and Facility

Please provide the information requested below for each facility, parcel, and site to help determine if potential exists for take (pages may be attached). If potential exists for take of the green sea turtle, measures to avoid impacts to the honu from the effects of light attraction may be required. Please consult with staff from the DLNR and the USFWS to arrange a site visit, if needed, discuss measures to avoid impacts to the honu, and provide further guidance.

<table>
<thead>
<tr>
<th>Are any of the facilities located adjacent to a beach?</th>
<th>Yes / No</th>
<th>If yes, provide length of beach frontage &amp; brief description of facilities &amp; lights adjacent to the beach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lihue Airport</td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

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<tr>
<th>Are any of the Covered Activities (lights) visible from a beach?</th>
<th>Yes / No</th>
<th>If yes, describe the specific lights (type, quantity, height, purpose) &amp; specific location; provide map &amp; photos showing distance from beach</th>
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<th>Have green sea turtles been known to nest on any beaches adjacent to the facilities?</th>
<th>Yes / No</th>
<th>If yes, provide information about nesting occurrences, if known, including location and date and any other information</th>
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<td>Lihue Airport</td>
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<td></td>
</tr>
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</table>
Kauai Harbors Item 4. If applicable, describe any lighting standards (e.g., foot-candles/area) required for facility operations or other requirements that necessitate the use of lighting (e.g., required for security, safety, operations). Describe the relevant standard, or regulation, and the areas and Covered Activities at the site (e.g., type of lighting) to which it applies.

U.S. Coast Guard. Harbors Operations

The USCG operates under the Pacific Area Instructions 16611. Lighting for harbor facilities is regulated and governed by paragraph #5 of this document, which reads as follows:

5. Lighting

A. Facilities should be illuminated at least to the level of twilight and should be provided sunset to sunrise. The minimum standard for illumination should be one-foot candle at 1 meter above ground. Dock work areas, container unloading and loading areas, waterfront, perimeter, restricted areas and all access points should have 5 foot-candle illumination.

B. Lighting should conform to federal regulations (e.g. OSHA) and comply with voluntary agreements such as U.S. Customs Sea Carrier or Super Carrier Initiatives (if applicable).

C. Updated lighting technology should be used, such as high-pressure sodium, mercury vapor, or metal halide lighting.

D. Lighting should be directed downward, away from guards or offices, or navigable waterways and should produce high contrast with few shadows.


A. General. The facility owner or operator must ensure the implementation of security measures in this section and have the capability to continuously monitor, through a combination of lighting, security guards, waterborne patrols, automatic intrusion-detection devices, or surveillance equipment, as specified in the approved Facility Security Plan (FSP), the:

1. Facility and its approaches, on land and water;
2. Restricted areas within the facility; and
3. Vessels at the facility and areas surrounding the vessels.

B. MARSEC Level 1. At MARSEC Level 1, the facility owner or operator must ensure the security measures in this section are implemented at all times, including the period from sunset to sunrise and periods of limited visibility. For each facility, ensure monitoring capability that:
1. When automatic intrusion-detection devices are used, activates an audible or visual alarm, or both, at a location that is continuously attended or monitored;

2. Is able to function continually, including consideration of the possible effects of weather or of a power disruption;

3. Monitors the facility area, including shore and waterside access to it;

4. Monitors access points, barriers and restricted areas;

5. Monitors access and movements adjacent to vessels using the facility, including augmentation of lighting provided by the vessel itself; and

6. Limits lighting effects, such as glare, and their impact on safety, navigation, and other security activities.

C. **MARSEC Level 2.** In addition to the security measures for MARSEC Level 1 in this section, at MARSEC Level 2, the facility owner or operator must also ensure the implementation of additional security measures, as specified for MARSEC Level 2 in the approved FSP. These additional measures may include:

1. Increasing the coverage and intensity of surveillance equipment, including the provision of additional surveillance coverage;

2. Increasing the frequency of foot, vehicle or waterborne patrols;

3. Assigning additional security personnel to monitor and patrol; or

4. Increasing the coverage and intensity of lighting, including the provision of additional lighting and coverage.

D. **MARSEC Level 3.** In addition to the security measures for MARSEC Level 1 and MARSEC Level 2, at MARSEC Level 3, the facility owner or operator must also ensure implementation of additional security measures, as specified for MARSEC Level 3 in the approved FSP. These additional security measures may include:

1. Switching on all lighting within, or illuminating the vicinity of, the facility;

2. Switching on all surveillance equipment capable of recording activities within or adjacent to the facility;

3. Maximizing the length of time such surveillance equipment can continue to record; or

4. Complying with the instructions issued by those responding to the security incident.
U.S. Coast Guard Code of Federal Regulations Title 33, Chapter I, Subchapter L, Part 126, Section 126.15 Conditions for designation as designated waterfront facility (33 CFR 126.15), the relevant parts of which read as follows:

(l) Lighting. That subject to applicable dim-out and blackout regulations, such waterfront facility is adequately illuminated during the handling, storing, stowing, loading, discharging or transporting of dangerous cargo thereon; and that kerosene and gasoline lamps and lanterns are not used on such waterfront facility.

****

(n) Adequacy of guarding, fire extinguishing equipment, and lighting. That the word ‘‘adequate’’, as used in paragraphs (a), (j), and (l) of this section with respect to guarding, fire extinguishing equipment, and lighting, respectively, means that determination which a reasonable person would make under the circumstances of the particular case. Unless there is gross noncompliance, the judgment and determination of the operator of the facility will be acceptable as fulfilling the requirements unless and until the Captain of the Port inspects the facility and notifies the operator thereof in writing in what respect the guarding, fire extinguishing equipment, or lighting, is deemed inadequate and affords such operator an opportunity to correct the deficiency.

U.S. Coast Guard Code of Federal Regulations Title 33, Part 127 – Waterfront Facilities Handling Liquefied Natural Gas and Liquefied Hazardous Gas, Subpart B – Waterfront Facilities Handling Natural Gas, provides:

§127.109 Lighting systems.

A. The marine transfer area for LNG must have a lighting system and separate emergency lighting.

B. All outdoor lighting must be located or shielded so that it is not confused with any aids to navigation and does not interfere with navigation on the adjacent waterways.

C. The lighting system must provide an average illumination on a horizontal plane one meter (3.3 feet) above the deck that is—

1. 54 lux (five foot-candles) at any loading flange; and

2. 11 lux (one foot-candle) at each work area.

D. The emergency lighting must provide lighting for the operation of the—

1. Emergency shutdown system;

2. Communications equipment; and

3. Firefighting equipment.
U.S. Coast Guard Code of Federal Regulations Title 33, Part 154, Facilities Transferring Oil or Hazardous Material in Bulk, Subpart C – Equipment Requirements, provides:

§154.570 - Lighting.

A. Except as provided in paragraph (c) of this section, for operations between sunset and sunrise, a facility must have fixed lighting that adequately illuminates:

1. Each transfer connection point on the facility;

2. Each transfer connection point in use on any barge moored at the facility to or from which oil or hazardous material is being transferred;

3. Each transfer operations work area on the facility; and

4. Each transfer operation work area on any barge moored at the facility to or from which oil or hazardous material is being transferred.

B. Where the illumination is apparently inadequate, the COTP may require verification by instrument of the levels of illumination. On a horizontal plane 3 feet above the barge deck or walking surface, illumination must measure at least:

1. 5.0 foot-candies at transfer connection points; and

2. 1.0 foot-candle in transfer operations work areas.

C. For small or remote facilities, the COTP may authorize operations with an adequate level of illumination provided by the vessel or by portable means.

D. Lighting must be located or shielded so as not to mislead or otherwise interfere with navigation on the adjacent waterways.


U.S. Department of Labor, Occupational Safety and Health Administration (OSHA)

OSHA Code of Federal Regulation Title 29, Part 1917, Marine Terminals, Subpart F - Terminal Facilities, provides:

§1917.123 Illumination.

A. Working and walking areas shall be illuminated. Unless conditions described in the regulations of the United States Coast Guard (33 CFR 126.15(1) and (n), and 33 CFR 154.570) exist in the case of specific operations, illumination in active work areas (for example, cargo transfer points) shall be of an average minimum light intensity of 5 foot-candles. The illumination in other work areas (for example, farm areas) shall be of an average minimum light intensity of 1 foot-candle except for security purposes when a minimum light intensity of 1/2 foot-candle shall be maintained. Where occasional work
tasks require more light than that which is consistently and permanently provided, supplemental lighting shall be used.

B. The lighting intensity shall be measured at the task/working surface in the plane in which the task/working surface is present.

C. Lights shall, so far as possible, be placed so that they will not shine in the eyes of employees.

Footnote: The United State Coast Guard, at 33 CFR 126.15(1) and (n), and 33 CFR 154.570 sets out requirements for illumination at "designated waterfront facilities" and "large oil transfer facilities." [48 FR 30909, July 5, 1983, as amended at 62 FR 40201, July 25, 1997]

Illuminating Engineering Society Standards

ANSI/IES RP-8-14. Roadway Lighting. IES RP-8-14 provides recommended practices for design of fixed lighting for roadways, streets, adjacent bikeways, and pedestrian ways. Its primary purpose is to provide recommended practices for designing new continuous lighting systems for roadways and streets to allow accurate and comfortable visibility at night of possible hazards in sufficient time to allow appropriate action. For a pedestrian, this can mean better visibility of the surrounds and the sidewalk, while for the driver of a motor vehicle, it will mean time to stop or to maneuver around an obstacle. The IES recommended illuminance values for continuously lighted intersections varies from 0.8-3.4 foot-candles corresponding to low to high pedestrian conflict areas at local to major streets and intersections.

American Association of State Highway and Transportation Organization (AASHTO) highway lighting requirements

The roadway lighting at harbor facilities was designed to meet safety standards established by AASHTO in their roadway lighting design guide. The AASHTO standards are the primary source for highway lighting policy, design and warranting used by state departments of transportation.

State of Hawaii Night Sky Protection Strategy, HRS Section 201-8.5

The provision requires all exterior light fixtures to be installed to be fully shielded, defined as “when the lighting fixture is shielded in such a manner that all light rays emitted by the fixture, either directly from the lamp, or indirectly from the fixture, are projected below a horizontal plane running through the lowest point of the fixture.” It also requires “every new outdoor lamp light fixture emitting more than three thousand lumens shall be required to be fully shielded and to have a correlated color temperature of four thousand Kelvin or less”. Navigational lights that are required for waterway, open ocean, and aircraft safety; and outdoor lighting fixtures that are necessary for compliance with applicable federal, state, or county design standards or guidelines that are related to health and safety for the general public are exempt. Fully shielded replacement lighting fixtures for state managed roadways and highways shall be installed on a case-by-case basis, subject to the availability of capital improvement project funding and compliance with applicable federal, state, or county design standards or guidelines.
Lihue Airport Item 4. If applicable, describe any lighting standards (e.g., foot candles/area) required for facility operations or other requirements that necessitate the use of lighting (e.g., required for security, safety, operations). Describe the relevant standard, or regulation, and the areas and Covered Activities at the site (e.g., type of lighting) to which it applies.

Detailed regulations and standards addressing lighting requirements at airports are prescribed in the following documents.

**FAA Advisory Circulars (AC)**

AC 150/5345-46E—Specifications for Runway and Taxiway Light Fixtures  

Errata sheet for AC 150/5345-46E  

This FAA advisory circular contains the Federal Aviation Administration (FAA) specifications for light fixtures to be used on airport runways and taxiways. These specifications cover the requirements for various types of runway and taxiway light fixtures and specifies the light type, use, light direction and color. When installed, these lights must be directional or omnidirectional and a specific color for visibility by pilots. All lighting designs contained in this standard are the only means acceptable for the airport to meet the lighting requirements of Title 14 CFR Part 139, Certification of Airports, Section 139.311, Marking, Signs and Lighting.

AC 150/5300-13—Airport Design (dated 2/26/2014)  

Much of the concentrated outdoor lighting at airports is directed at aircraft parked at aprons located in the nonmovement area of an airport near or adjacent to the terminal area. The function of an apron is to accommodate aircraft during loading and unloading of passengers and or cargo. Activities such as fueling, maintenance and short/long-term parking take place on an apron. Apron layout depends on aircraft gate positions; aircraft and ground vehicle circulation needs; and aircraft clearance requirements. FAA advisory circular AC 150-5300-13A, Section 510 and A5-8 on marking and lighting of aprons, stipulates that “area lighting of apron areas is desirable, especially at terminal gates. The area light beams must be directed downward and away from runway approaches and control towers. Shielding of the lights may be needed to minimize unwanted glare. Area light spread should cover aircraft service areas. Refer to Illuminating Engineering Society of North America (IES), Recommended Practice for Airport Service Area Lighting, for additional guidance on apron area lighting.”

**Illuminating Engineering Society Standards**

IES RP-37-15 Outdoor Lighting for Airport Environments. IES RP-37-15 provides recommended practices for all outdoor lighting - air side and land side – for commercial airports. It is essential to provide at least minimum levels of light for safety and efficiency in conducting all work tasks in various areas of the airport. IES RP-37-15 provides guidance for an adequate and safe lighted environment while emphasizing restrictions, regulations and best practices for aircraft servicing and
apron areas; aircraft support services, i.e., fueling, cargo, baggage load/unload; passenger loading and unloading; roadways; vehicle parking facilities; and pedestrian walkways. Aprons and ramp lighting needs to provide illumination of aircraft from nose to tail for servicing and between 2-5-foot candles for tasks such as maintenance, fueling, and cargo loading and unloading. IES recommends illumination standards of between 1-5-foot candles for the landside areas of the airport including parking facilities, parking lots, pedestrian walkways, vehicle transaction areas, and between 0.8-3.4. IES standards for roadway intersections, and 3.0-foot candles for secure access search area parking and roadways. Roadway lighting should eliminate the uplight component. IES standard for security includes vertical lighting in all cases where there is a need to identify people’s face and body language and minimize shadows or a silhouette effect as the person moves through a space.

**American Association of State Highway and Transportation Organization (AASHTO) highway lighting requirements**

The roadway lighting at the Lihue Airport was designed to meet safety standards established by AASHTO in their roadway lighting design guide. The AASHTO standards are the primary source for highway lighting policy, design and warranting used by state departments of transportation.

**TSA Airport Security Requirements**

Airport security is regulated by TSA under Title 49 Code of Federal Regulations (CFR), part 1542. TSA requires that lighting be of sufficient intensity installed in areas requiring such protection to sufficiently light those areas where vehicles and aircraft maneuver so that such maneuvering may be done safely. In addition, lighting must be sufficient to detect the presences of persons or vehicles and afford positive identification during hours of darkness. Lighting must not affect the night vision requirements of the flight crew members, nor cause direct glare conditions. Lighting must be provided along the airport perimeter and at manned access gates.

**State of Hawaii Night Sky Protection Strategy, HRS Section 201-8.5**

The provision requires all exterior light fixtures to be installed to be fully shielded, defined as “when the lighting fixture is shielded in such a manner that all light rays emitted by the fixture, either directly from the lamp, or indirectly from the fixture, are projected below a horizontal plane running through the lowest point of the fixture.” It also requires “every new outdoor lamp light fixture emitting more than three thousand lumens shall be required to be fully shielded and to have a correlated color temperature of four thousand Kelvin or less”. Navigational lights that are required for waterway, open-ocean, and aircraft safety; and outdoor lighting fixtures that are necessary for compliance with applicable federal, state, or county design standards or guidelines that are related to health and safety for the general public are exempt. Fully shielded replacement lighting fixtures for state managed roadways and highways shall be installed on a case-by-case basis, subject to the availability of capital improvement project funding and compliance with applicable federal, state, or county design standards or guidelines.

**Kauai Harbors Item 5. Describe any plans/proposals for future facilities or expansion of existing facilities. Include any proposed structures and lighting by type, purpose, and location. Plans (architecture and site plans), photos, and drawings can be attached.**
The Harbors Modernization Plan identifies proposed future facilities for HDOT-H. The plan does not contain proposals for future facilities or expansion of existing facilities on the island of Kauai. During December 2013, HDOT-H executed a 20-year term contract with Johnson Controls, Inc. (JCI), to address current and future energy conservation needs, as well as to be dark sky friendly in compliance with HRS § 201-8.5 and to serve as a model for other agencies to follow. In September 2015, the Harbors Division negotiated a $26,200,000 energy savings improvement contract with JCI for approximately 1,030,443 square feet of buildings and 18,025,128 square feet of exterior lighted areas, with a projected 40% average annual energy savings. Approximately 2,346 high-mast light fixtures and 3,381 interior, roadway, and parking lot light fixtures were replaced with variable controls to be in compliance with Occupational Safety and Health Administration (OSHA) rules and the USCG 5-foot candle power requirement in working areas. The new fixtures feature the ability to dim and turn off lighting when not needed, in compliance with Hawaii Revised Statutes section 201-8.5—night sky protection strategy (dark sky friendly). Nawiliwili Harbor has completed its lighting upgrade with full cut-off lights at a cost of $1,209,561.

JCI, HDOT-H’s lighting contractor, has completed the lighting upgrades at Port Allen Harbor. These upgrades also include full cut-off lights at a cost of $102,715.

The HDOT-H designed its lighting to be compliant with the dark sky strategy under HRS § 201-8.5. Accordingly, the HDOT-H has worked toward light fixture designs with light cut-offs to prevent flooding or light pollution above light fixtures. The Kauai Harbors lights were designed to address one concern that may attract migratory birds. The HDOT-H is willing to explore the feasibility of installing light filters to reduce the white/blue hues of the LED light fixtures within safety and security considerations and is currently testing such light filters at Hilo Harbor.

Lihue Airport Item 5. Describe any plans/proposals for future facilities or expansion of existing facilities. Include any proposed structures and lighting by type, purpose, and location. Plans (architecture and site plans), photos, and drawings can be attached.

An HDOT-A contract to repave the runway at Lihue Airport has been awarded. Initially, the repaving was scheduled to take place during evening hours to accommodate the landing and taking off of aircraft. Due to concerns regarding construction lights and airfield lighting during the 2018 seabird fallout season, completion of this project is currently on hold.

HDOT-A has completed Phase 1 lighting upgrade at Lihue Airport that included new full cut-off solar street lights along Ahukini road, full cut-off solar lights in parking lots and maintenance baseyard, new LED site lighting at fire department and maintenance hangars, and new LED light fixtures in the passenger loading and unloading, baggage handling, and interior holding areas in the terminal. Phase 1 improvements at Lihue cost $5,809,601 and were completed in 2016.

HDOT-A has initiated a contract for Phase 2 airport lighting upgrade that will include new full cut-off LED exterior light fixtures with pole, wall and bollard mounting locations. Phase 2 will upgrade exterior lighting in the T-hangers, commuter terminal, maintenance area, cargo terminal, FedEx building, walkway in public parking lot, and wall mounted lighting in the main apron (ramp) area. Phase 2 improvements at Lihue will cost $1,179,314 and are scheduled to be completed in 2018.

HDOT-A has initiated planning with its lighting contractor for Phase 3 of lighting improvements to upgrade 45 high mast lights at its main and cargo apron (ramp) at Lihue and other airports. A pilot
project is being conducted at Hilo Airport to identify the appropriate lighting upgrade that will meet FAA and TSA safety and security requirements, and incorporate any new research on lighting conditions that can reduce artificial light attraction for seabirds. The implementation of Phase 3 will depend on identification of an appropriate light fixture that improves conditions and on securing funding for construction through the legislative budget process. The estimated budget for Phase 3 improvements is $1,917,386, and the tentative timeline for implementation is 2020-2025.

**Kauai Harbors Item 6. Pursuant to the Endangered Species Act (ESA), Section 10 (a)(2)(A)(iii), describe alternatives to avoid the taking considered and evaluated. Provide reasons why those alternatives are not being utilized. Alternatives can include operational or facility design changes (attach pages as needed). The tables below may be altered as needed.**

Nawiliwili Harbor and its operational and administrative activities are regulated by DHS, USCG, CBP, and OSHA. See Kauai Harbors Item 4, above.

USCG and OSHA regulate lighting located in operational areas of the port for security and safety compliance. USCG regulates maritime security nationally and sets security requirements for maritime facilities. Facility owners or operators in general must implement facility security measures and continuously monitor facilities through a combination of lighting, security guards, patrols, detection devices, or surveillance equipment, including the period from sunset to sunrise and periods of limited visibility. USCG requires and approves a FSP for each regulated commercial harbor to identify, prevent, and detect terrorist-related activities in accordance with Title 33, Code of Federal Regulations, Part 105, Subpart D Facility Security Plan (33 CFR 105.405). Known or perceived threats are reflected by assignment of Maritime Security threat codes, which require that applicable security measures be implemented in accordance with the FSP. As threat levels increase, the facility may need to increase coverage and intensity of lighting to higher security levels.

USCG also approves all DHS grants under the Port Security Grant Programs, including the Homeland Security Communications Project (security cameras) and the Port Grant Maritime Network Project. These projects centralize security cameras for surveillance at all regulated commercial harbors in Hawaii, in compliance with the Area Maritime Transportation Security Plans, to strengthen core security capabilities and critical port infrastructure and help achieve the National Preparedness Goal.

Because of USCG security monitoring requirements and OSHA worker safety regulations, alternatives or minimization measures that require operational or facility design changes are limited to those that can comply with existing national security and safety requirements.

1. Avoidance Alternative-The “No Incidental Take” Alternative: Turn off/deactivate all outdoor lights from dusk to dawn during the fledgling fallout season, September 15 to December 15.

This is not a viable alternative for Nawiliwili Harbor and Port Allen Harbor because of USCG and OSHA security and safety requirements.

   a. Nawiliwili Harbor (Kauai Harbors Table 5).

      Nawiliwili Harbor is Kauai’s primary cargo and cruise ship port, supporting the island’s economy with essential shipments of food, clothing, building materials, cars
and fuel. Interisland cruise ships (Norwegian Cruise Lines, Princess, and others) and seasonal foreign cruise ships use Nawiliwili Harbor, accommodating visitors who support the island’s economy.

1. Maritime shipping and cruise ship schedules have vessels in port during all or portions of the night on a regular schedule, necessitating terminal operations at night. The cargo loading areas are lighted when cargo vessels are at berth and during off-loading and on-loading of cargo. The terminal also remains operational when cruise ships remain at berth overnight, allowing passengers to leave the ships to enjoy local activities, dining, and shopping, and eventually to return to the ships.

2. OSHA requires that terminal lights provide illumination at a measurement of five foot-candles for active work areas, and one foot-candle in other work areas, and ½ foot-candle for security purposes (OSHA 29 CFR 1917.123). Terminal lights must thus be activated at specified intensities to enhance worker and public safety during night cargo and passenger operations.

3. USCG oversees the security precautions, hazardous cargo handling, and port operations of Nawiliwili Harbor. USCG regulations and guidance published as Navigation and Vessel Inspection Circulars (NVICs), dictate that terminal lights provide security illumination throughout the night as a security measure for protection of passengers, facilities, personnel, vessels, cargo, and critical infrastructure, as well as for the prevention of terrorist attack (USCG 33 CFR 105.260, 105.275). USCG regulations require that harbor facilities have adequate illumination during the handling, storing, stowing, loading, discharging, or transporting of dangerous cargo between sunset and sunrise, and that fixed lighting provide illumination of between 1 to 5 foot-candles in operation areas (USCG 33 CFR 154.570, 127.109, 126.15)

b. Port Allen Harbor (Kauai Harbors Table 6).

Port Allen Harbor services liquid bulk cargo oil shipments, excursion and charter boats, and commercial fishing operations at its southern berths. Liquid bulk cargo and excursion and charter boat activities are generally daylight operations. Charter and excursion tenants service their boats in late afternoon and into early evening. Commercial fishing boats will occasionally berth on the southern pier and perform maintenance operations at night. The southern pier is open to public access and heavily used by the public for night fishing. The southern berths are illuminated by wall-mounted shed lights, which are shielded and fully cut off. The pier’s northern berths are leased to the U.S. Navy PMRF. These berths are also illuminated by wall-mounted shed lights. The parking lot is illuminated by two shed-mounted flood lights.

1. Commercial fishing boats and excursion and charter boats may use the south pier for 24-hour maintenance needs and emergency shelter. The public uses the pier for access to commercial charters and excursion operators, which can come and go after dark. The pier is also used by the public for recreational fishing at night. As a public commercial harbor that provides maritime cargo
operations and passenger services, night lighting is needed for passenger, worker, and public safety (OSHA 29 CFR 1917.123, USCG 33 CFR 126.15, 154.570).

2. The U.S. Navy leases the northern berths and requires overnight lighting for security purposes.

2. Avoidance Alternative-Restricted Usage of Lighting Alternative: Change operations to eliminate the need for outdoor artificial lighting (e.g., from nighttime to daytime hours)

This is not a viable alternative for Nawiliwili Harbor and Port Allen Harbor because of USCG and OSHA security and safety requirements.

a. Nawiliwili Harbor (Kauai Harbors Table 5).

Maritime shipping and cruise ship schedules have vessels arriving, departing, and in port during all or portions of night. USCG and OSHA regulations require nighttime lighting for security, cargo handling operations, cruise line passenger service, and worker safety whenever vessels and workers are at the port between sunset and sunrise (OSHA 29 CFR 1917.123; USCG 33 CFR 105.275, 126.15, 127.109, 154.570). As a designated commercial port, Nawiliwili needs to provide these nighttime services to accommodate maritime commerce and maritime emergencies. Provision of these services cannot be shifted entirely to daytime hours.

b. Port Allen Harbor (Kauai Harbors Table 6).

Commercial fishing boats and excursion and charter boats may use the south pier for maintenance and emergency shelter during all portions of the night. Public access to commercial charters and excursion operators and to recreational fishing, occurs at night. USCG and OSHA regulations require nighttime lighting for cargo handling, passenger service, and worker safety whenever vessels and workers are at the port between sunset and sunrise (OSHA 29 CFR 1917.123; USCG 33 CFR 126.15, 154.570). As a public commercial harbor, Port Allen needs to provide these nighttime services to accommodate maritime commerce and maritime emergencies. Provision of these services cannot be shifted entirely to daytime hours. The U.S. Navy lights its berths for security purposes throughout the night.

The HDOT-H designed its lighting to be compliant with the dark sky strategy under HRS § 201-8.5. Accordingly, the HDOT-H has worked toward light fixture designs with light cutoffs to prevent flooding or light pollution above light fixtures. The Kauai Harbors lights were designed to address one concern that may attract migratory birds. The HDOT-H is willing to explore the feasibility of installing light filters to reduce the white/blue hues of the LED light fixtures within safety and security considerations, and is currently testing such light filters at Hilo Harbor.
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<thead>
<tr>
<th>Artificial Light Attraction Alternatives to the Taking Considered</th>
<th>Reasons Alternatives Are Not Being Utilized (Provide Justification)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avoidance Alternative-The “No Incidental Take” Alternative: Deactivate all outdoor artificial lights from dusk to dawn during the fledgling fallout season (September 15 to December 15)</td>
<td>Nawiliwili Harbor is Kauai’s primary cargo and cruise ship port. Maritime shipping and cruise ship schedules have vessels in port during all or portions of night. USCG regulation 33 CFR sections 105.275, 126.15, 127.109, and 154.570 require that marine terminal facilities provide adequate illumination throughout the night for security and safe handling of hazardous cargo. OSHA regulation 29 CFR section 1917.123 requires that marine terminal facilities provide illumination at a measurement of one to five foot-candles in work areas and ½ foot-candle for worker safety. Whenever cargo handling and cruise line passenger services are provided after dark, facility lights must be activated at specified intensities to enhance worker and public safety. Because of security and safety requirements, this is not a viable alternative for Nawiliwili Harbor.</td>
</tr>
<tr>
<td>Avoidance Alternative-Restricted Usage of Lighting Alternative: Change operations to eliminate the need for outdoor artificial lighting (e.g., from nighttime to daytime hours)</td>
<td>Nawiliwili Harbor: Maritime shipping and cruise ship schedules have vessels in port during all or portions of night. USCG and OSHA require night lighting for security and worker and public safety (OSHA 29 CFR 1917.123; USCG 33 CFR 105.275, 126.15, 127.109, 154.570). Nawiliwili Harbor needs to provide these nighttime services to accommodate maritime commerce and maritime emergencies. Provision of these services cannot be shifted entirely to daytime hours. Because of security and safety requirements, this is not a viable alternative for Nawiliwili Harbor.</td>
</tr>
<tr>
<td>Avoidance Alternative-Restricted Usage of Lighting Alternative: Shield all lights from visibility from the beach, or screen all honu nests, from May 15 to December 15 to avoid impacting the green sea turtle (honu)</td>
<td>Nawiliwili Harbor: Not applicable. No beach area is adjacent to Nawiliwili Harbor.</td>
</tr>
<tr>
<td>Other alternatives to the taking considered, if any. If facility is proposed, include alternative designs considered</td>
<td>Not applicable.</td>
</tr>
</tbody>
</table>
### Kauai Harbors Table 6. Light Attraction Alternatives to the Taking—Port Allen Harbor

<table>
<thead>
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<tr>
<td><strong>Avoidance Alternative-The “No Incidental Take” Alternative:</strong> Deactivate all outdoor artificial lights from dusk to dawn during the fledgling fallout season (September 15 to December 15)</td>
<td>Port Allen Harbor services liquid bulk cargo, excursion/charter boats, and commercial fishing operations. Most are generally daylight operations, but commercial fishing boats and excursion/charter boats may use the south pier for maintenance and emergency shelter. The public uses the pier for access to commercial charters and excursion operators, which can come and go after dark. The pier is also used by the public for recreational fishing at night. As a public commercial harbor that provides maritime cargo operations, passenger services, and public access, night lighting is needed for passenger, worker, and public safety (OSHA 29 CFR 1917.123, USCG 33 CFR 126.15, 154.570). The U.S. Navy leases the northern berths, which are lighted overnight. The U.S. Navy requires lights for security purposes. Because of security and safety requirements, this is not a viable alternative for Port Allen Harbor.</td>
</tr>
<tr>
<td><strong>Avoidance Alternative-Restricted Usage of Lighting Alternative:</strong> Change operations to eliminate the need for outdoor artificial lighting (e.g., from nighttime to daytime hours)</td>
<td>Port Allen Harbor: Commercial fishing boats and excursion/charter boats may use the south pier for maintenance and emergency shelter during all portions of the night. Public access to commercial charters and excursion operators, and recreational fishing, occurs at night. USCG and OSHA regulations require nighttime lighting for cargo handling, passenger service, and worker safety whenever vessels and workers are at the port between sunset and sunrise (OSHA 29 CFR 1917.123, USCG 33 CFR 126.15, 154.570). As a public commercial harbor, Port Allen needs to provide these nighttime services to accommodate maritime commerce and maritime emergencies. Provision of these services cannot be shifted entirely to daytime hours. The U.S. Navy lights its berths for security purposes all night. Because of security and safety requirements, this is not a viable alternative for Port Allen Harbor.</td>
</tr>
<tr>
<td><strong>Avoidance Alternative-Restricted Usage of Lighting Alternative:</strong> Shield all lights from visibility from the beach, or screen all honu nests, from May 15 to December 15 to avoid impacting the green sea turtle (honu)</td>
<td>Port Allen: Not applicable. No beach areas are adjacent to Port Allen Harbor.</td>
</tr>
<tr>
<td><strong>Other alternatives to the taking considered, if any. If facility is proposed, include alternative designs considered</strong></td>
<td>Not applicable.</td>
</tr>
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</table>
Lihue Airport Item 6. Pursuant to the Endangered Species Act (ESA), Section 10 (a)(2)(A)(iii), describe alternatives to avoid the taking considered and evaluated. Provide reasons why those alternatives are not being utilized. Alternatives can include operational or facility design changes (attach pages as needed). The tables below may be altered as needed.

Avoidance measures seek to avoid adverse effects of lighting on covered seabird species, thereby reducing the chance of incidental take. Kauai Seabird HCP Applicants will be required to implement avoidance alternatives to the “maximum extent practicable” per applicable state and federal laws to receive an incidental take permit/license.

Avoidance measures are those which cease or suspend lighting activities posing threats to the Covered Species. If avoidance measures are not deemed practicable due to facility safety or security reasons, then the applicant must utilize minimization measures to reduce their threats to seabirds.

Kauai Seabird HCP applicants are required to provide justification, such as policies, regulations, or other rationale, for avoidance measures that will not be implemented.

Avoidance Alternatives Considered

Lihue Airport is classified by the FAA as a Class I Airport, certified to serve scheduled and unscheduled operations of large air carrier aircraft. In order to serve air carrier operations, Lihue Airport is required to hold a Part 139 Air Operating Certificate issued by the FAA, to ensure safety in air transportation. To obtain a certificate, an airport must meet certain operational and safety standards, including having Part 139 compliant runway/taxiway and apron lighting and signage, lighting, and obstruction lighting. It also operates under an Airport Security Program (ASP) approved by the Transportation Security Administration (TSA) requiring security and safety measures be implemented at Lihue Airport. NOTE: The ASP is classified and its contents are Sensitive Security Information. The airport provides passenger and aircraft facilities for domestic overseas carriers, interisland carriers, commuter air taxi, air cargo, concession, tenant, and general aviation activities, with well over 100,000 aircraft operations per year. Aircraft operations and servicing occur during nighttime hours and require adequate lighting.

Avoidance alternatives considered for HDOT-A facilities on Kauai are described below and in Lihue Airport Table 3. Each alternative description below is followed by a feasibility determination.

1. Avoidance Alternative-The “No Incidental Take” Alternative: Deactivate all outdoor artificial lights from dusk to dawn during the seabird fallout period (September 15–December 15) each year.

   This is not a viable alternative for Lihue Airport because of FAA and TSA security and safety requirements and regulations.

   a. Lihue Airport is a FAA Class I Airport certified to serve scheduled and unscheduled operations of large air carrier aircraft day and night. Airport lights are required by the FAA for aeronautical safety. The FAA requires specified lighting for runway, taxiway, apron (ramp) operations, and passenger terminal operations. Runway and taxiway lights, by regulation, face skyward to ensure safe aeronautical operations. These lights cannot be deactivated without endangering the lives of passengers and flight crews.
Additionally, the FAA will levy penalties and sanctions if runway, taxiway, and apron lights are not activated during flight operations. TSA also requires lighting for security and safety reasons. The IES has established public safety standards for outdoor lighting for the various airport environments that specify lighting during periods when the public or workers are present and minimum light levels for security. Because the airport is open 24 hours per day, nighttime lighting is required for aspects of airport operations during all or portions of the night.

b. Ahukini Road is an internal airport roadway under HDOT-A’s jurisdiction open to the public 24 hours a day. The American Association of State Highway and Transportation Organization (AASHTO) and IES have established lighting standards for public highways and airport roadways to ensure adequate visibility for safe motorist and pedestrian use. Ahukini Road lights meet the AASHTO and IES guidelines. Because public safety is of primary concern, Ahukini Road must remain illuminated during the night. HDOT would be liable for accidents and fatalities if Ahukini Road were inadequately illuminated.

2. Avoidance Alternative-Restricted Usage of Lighting Alternative: Change operations to eliminate the need for outdoor artificial lighting (e.g., from nighttime to daytime hours)

This is not a viable alternative for Lihue Airport due to FAA and TSA security and safety requirements and regulations.

a. Lihue Airport is an FAA Class I Airport certified to serve scheduled and unscheduled operations of large air carrier aircraft day and night. Airport lights are required by the FAA for aeronautical safety. TSA requires lighting for security and safety.

b. Ahukini Road lights must operate at night to ensure motorist and pedestrian safety as required by the AASHTO and IES guidelines for driver safety. This road needs to be accessible to motorists 24 hours a day.
### Lihue Airport Table 3. Light Attraction Alternatives to the Taking

<table>
<thead>
<tr>
<th>Artificial Light Attraction Alternatives to the Taking Considered</th>
<th>Reasons Alternatives Are Not Being Utilized (Provide Justification)</th>
</tr>
</thead>
</table>
| **Avoidance Alternative-The “No Incidental Take” Alternative:** Deactivate all outdoor artificial lights from dusk to dawn during the fledgling fallout season (September 15 to December 15) | a. It is not feasible for HDOT-A to deactivate all outdoor lights from dusk to dawn at any time of the year. Lihue Airport operates year-round and is subject to FAA and TSA lighting safety and security regulations. Airport lights are required by the FAA for aeronautical safety. The FAA requires specified lighting for runway, taxiway, and apron operations. These lights cannot be deactivated without endangering the lives of passengers and flight crews. Additionally, the FAA will levy penalties and sanctions if runway, taxiway, and apron lights are not activated during flight operations. TSA also requires adequate lighting for security and safety. IES provides recommended practices for all outdoor lighting - air side and land side – for commercial airports to provide an adequate and safe lighted environment.  
b. Ahukini Road, which fronts Lihue Airport, is under the HDOT-A’s jurisdiction. Ahukini Road lights are required for motorist and pedestrian safety. AASHTO and IES have established lighting standards for adequate and safe public use of Ahukini Road. Ahukini Road is open to public use 24 hours per day, and deactivating lights would present a safety hazard. Because motorist safety is of primary concern, Ahukini Road must remain illuminated at night for pedestrian and motorist safety. |
| **Avoidance Alternative-Restricted Usage of Lighting Alternative:** Change operations to eliminate the need for outdoor artificial lighting (e.g., from nighttime to daytime hours) | a. It is not feasible for HDOT-A to change operations to eliminate the need for outdoor artificial lighting at Lihue Airport. Given the nature of the airport’s 24 hours per day, 7 days a week operations, it is necessary for outdoor lights to be illuminated during nighttime hours, to ensure safety for air travel, air carriers, passengers, and workers. Additionally, FAA requires specific lighting for runways, taxiways, and aprons. TSA also requires adequate lighting for security purposes. The airport and public access roadway are open 24 hours per day and require adequate and safe lighting during nighttime hours. |
| Shield all lights from visibility from the beach, or screen all honu nests, from May 15 to December 15 to avoid impacting the green sea turtle (honu). | Not applicable |
| Other alternatives to the taking considered, if any. If facility is proposed, include alternative designs considered. | Not applicable |
Kauai Harbors Item 7. Describe all site-specific seabird minimization measures considered for the Covered Activities. This item should follow KSHCP minimization objectives and measures as specified in Appendix E (Guidelines for Adjusting Lighting at Facilities) of the KSHCP document. Please consult with staff from the DOFAW and the USFWS as needed. The suggested tables below can be altered as needed.

Minimization measures modify the Covered Activities to reduce the effects of the activity on the Covered Species. KSHCP Participants will be required to implement minimization measures that apply to the facility to the “maximum extent practicable” per applicable state and federal laws, which regulate incidental take license/permit issuance by the DLNR and the USFWS.

Minimization also entails searching for and recovering grounded seabirds to minimize the chance of mortality. In addition, the presence of on-site predators (i.e., feral cats, dogs) should be controlled and removed because these animals can prey on grounded seabirds.

Provide justification, such as policies, regulations, or other rationale for measures that will not be implemented.

The following section and tables discuss minimization alternatives that HDOT-A considered for Nawiliwili and Port Allen Harbors to reduce impacts to the “maximum extent practicable”:

1. Minimization Alternative: Transition to shielded and/or full cut-off fixtures.
   a. Nawiliwili Harbor.

   USCG and OSHA regulate the lighting located in operational areas for security and safety compliance. USCG regulates maritime security nationally and sets security requirements for maritime facilities. Facility owners or operators in general must implement facility security measures and continuously monitor facilities through a combination of lighting, security guards, patrols, detection devices, or surveillance equipment, including the period from sunset to sunrise and periods of limited visibility. USCG also approves all DHS grants under the Port Security Grant Programs, including the Homeland Security Communications Project (security cameras) and the Port Grant Maritime Network Project. These projects centralize security cameras for all regulated commercial harbors in Hawaii, in compliance with the Area Maritime Transportation Security Plans, to strengthen core security capabilities and critical port infrastructure and help achieve the National Preparedness Goal. USCG also requires a FSP for each regulated commercial harbor to identify, prevent, and detect terrorist-related activities in accordance with Title 33, Code of Federal Regulations, Parts 105, Section 105.405.

   Nawiliwili Harbor already has completed a lighting upgrade to full cut-off LED lights. The harbor has replaced high-mast flood lighting in the cargo operations areas with high-mast, full cut-off LED fixtures.

   b. Port Allen Harbor.
The pier’s southern berths are illuminated by wall-mounted shed lights, which have been upgraded to full cut-off fixtures. The pier shed has flood lights that illuminate the parking area and are installed with an aiming angle to achieve full cut-off functionality. HDOT-H will investigate if additional shielding may reduce horizontal light escapement within safety and security lighting requirements.

The pier’s northern berths are under lease and control of the U.S. Navy PMRF. PMRF is responsible for implementing minimization measures under its ESA obligations.

2. Minimization Alternative: Reduce the number of lights activated from dusk to dawn during the fledgling fallout season (September 15 to December 15).

a. Nawiliwili Harbor.

Nawiliwili Harbor’s terminal yard lights have been wired so that a portion of the bulbs in the high-mast light fixtures can be turned off (dimmed) during non-operational hours, leaving a smaller portion of the bulbs activated when no operations are in progress. The deactivation varies per light fixture and location, but all of the high mast light fixtures upgraded during Phase 1 improvements have dimming capability. The usual night lighting at Nawiliwili Harbor involves dimming high-mast LED yard lights when no operations are in progress, and turning on to full illuminance only when active cargo or passenger operations are occurring, and only at the specific pier and portion of the pier where those operations are in progress (normally dusk to 10:00 pm on Tuesdays and Fridays at Pier 3, and overnight on Thursdays for the cruise line terminal at Pier 2). When passenger or cargo operations are not in progress, the high mast lights are dimmed and building lights are turned off, with the exception of wall pack lights for security purposes. HDOT will provide outreach and training to staff and harbor tenants to manage light attraction risks and to turn off external lighting when work is completed.

b. Port Allen.

HDOT-H has implemented an upgrade of lights at Port Allen Harbor to full cut-off fixtures. There are no high mast lights at this facility, and the lights that illuminate the southern berths are wall-mounted shed lights. The wall pack night lighting for Port Allen is set on a timer to turn on from dusk to dawn, but to turn on only every other wall pack fixture to provide security and safety lighting. HDOT will provide outreach and training to staff and harbor tenants to manage light attraction risks and to turn off external lighting when work is completed. The lights that illuminate the northern berths are controlled by the U.S. Navy PMRF. Any reduction in the number of lights activated on the north pier must be coordinated with and approved by the PMRF.

Additional minimization alternatives are discussed in Kauai Harbors Tables 7 and 8.
<table>
<thead>
<tr>
<th>Minimization Measures Considered</th>
<th>Feasible? (Y/N)</th>
<th>If Not Feasible, Provide Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change time of light use (lights off earlier)</td>
<td>Partially</td>
<td>Full illumination of lights is used only when longshoremen personnel require them. Lights are dimmed or switched off once cargo loading and unloading is finished. The usual night lighting at Nawiliwili Harbor for the high-mast LED yard lights is a dimmed setting. The high-mast lights are turned on to full illuminance only when active cargo or passenger operations are occurring and only at the specific pier where those operations are in progress (normally dusk to 10:00 pm on Tuesdays and Fridays at Pier 3, and overnight on Thursdays for the cruise line terminal at Pier 2).</td>
</tr>
<tr>
<td>Deactivate unnecessary lights</td>
<td>Partially</td>
<td>Most harbors lights are dimmed during non-operational hours. High-mast LED yard lights are turned on full illuminance only on the specific days and at the specific piers where active cargo or passenger operations are occurring, and only while those operations are in progress. HDOT will provide outreach and training to staff and harbor tenants to manage light attraction risks and to turn off external lighting when work is completed.</td>
</tr>
<tr>
<td>Replace all outdoor lights with full cut-off fixtures</td>
<td>Yes</td>
<td>Nawiliwili Harbor has completed a light transition plan. HDOT-H has replaced high-mast flood lights with new, full cut-off, downward-pointing LED fixtures. Full cut-off functionality for flood lights is achieved by aiming angle.</td>
</tr>
<tr>
<td>Shield all outdoor lights with full cut-off shields</td>
<td>Yes</td>
<td>Nawiliwili Harbor has completed a transition plan to replace outdoor lights with downward-pointing, full cut-off fixtures. The cut-off specifications are inherent in the fixture, and no additional shielding is needed. Full cut-off functionality for some flood lights is achieved by aiming angle. HDOT-H will investigate if additional shielding may reduce horizontal light escapement within safety and security lighting requirements.</td>
</tr>
<tr>
<td>Angle all lights downward</td>
<td>Yes</td>
<td>Nawiliwili Harbor has completed a transition plan to replace outdoor lights with downward-pointing, full cut-off fixtures. Full cut-off functionality for flood lights is achieved by aiming angle.</td>
</tr>
<tr>
<td>Lower intensity (lumens) of outdoor lights</td>
<td>Partially</td>
<td>The usual night lighting at Nawiliwili Harbor for the high-mast LED yard lights is a dimmed setting. The high-mast lights are turned on to full illuminance only when active cargo or passenger operations are occurring, and only at the specific pier where those operations are in progress (normally dusk to 10:00 pm on Tuesdays and Fridays at Pier 3, and overnight on Thursdays for the cruise line terminal at Pier 2). The lumen levels of the lights cannot be permanently lowered because it does not provide the foot-candle illumination required by USCG and OSHA for adequate worker and public safety while cargo and passenger services are being provided (OSHA 29 CFR 1917.123; USCG 33 CFR 154.570, 127.109, 126.15).</td>
</tr>
<tr>
<td>Change bulb color to non-white spectrum</td>
<td>No</td>
<td>The new LED lights installed by HDOT-H are phosphor coated to 4000k and cannot be individually changed. To change the bulb color from white 4000k spectrum would require replacing the entire light fixture at a high cost. Additional research is needed on what light spectrum is not an attraction to seabirds for future lighting improvements. The HDOT-H designed its lighting to be compliant with the dark sky strategy under HRS § 201-8.5. Accordingly, the HDOT-H has worked toward light fixture designs with light cut-offs to prevent flooding or light pollution above light fixtures. The Kauai Harbors lights were designed to address one concern that may attract migratory birds. The HDOT-H will explore the use of electronic filters for lights to produce a non-white spectrum within safety and security considerations for future light improvements. HDOT-A is currently testing such light filters at Hilo Airport. Additionally, USCG and OSHA regulations (OSHA 29 CFR 1917.123; USCG 33 CFR 154.570, 127.109, 126.15) require minimum lighting standards for security and safety. Non-white spectrum bulbs would have to meet the foot-candle illumination required for safety and security. The</td>
</tr>
<tr>
<td>Minimization Measures Considered</td>
<td>Feasible? (Y/N)</td>
<td>If Not Feasible, Provide Reason</td>
</tr>
<tr>
<td>---------------------------------</td>
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<td>-------------------------------</td>
</tr>
<tr>
<td>Lower height of light poles</td>
<td>No</td>
<td>Cargo operations in limited terminal acreage result in containers being stacked four to five units high. Container stacks could reach as high as 40 feet (containers are generally 8 feet high). Cargo terminal lights must therefore be mounted on poles at significant heights above the containers. This height ensures the containers will not block the lights and that the aisles between rows of stacked containers are satisfactorily illuminated. Nawiliwili Harbor terminal lights are thus mounted on high poles to provide the requisite lighting for ground-level operations (OSHA 29 CFR 1917.123; USCG 33 CFR 154.570, 127.109, 126.15).</td>
</tr>
<tr>
<td>Prohibit/control unleashed predatory animals; prohibit outdoor feeding of animals; require sealed rubbish containers</td>
<td>Yes</td>
<td>HDOT-H staff will, or contract with USDA Wildlife Services (WS) or other contractor to, conduct animal control as part of its management responsibility. Animal control includes trapping and removing cats and conducting surveillance to detect and remove dogs that may enter the facilities. All rubbish is contained in sealed depositories that are removed routinely by the County.</td>
</tr>
<tr>
<td>Provide Worker Seabird Awareness Training to staff</td>
<td>Yes</td>
<td>USDA WS or other contractor will provide seabird awareness training to HDOT-H staff and harbor security personnel in August prior to the seabird fallout season and on a routine and regular basis throughout the season; workers and security personnel are given summary orientation that enables them to identify seabird species under differing scenarios, including in flight and grounded (alive, injured, dead) and provides written instructions on how to handle and report observations or encounters with grounded seabirds.</td>
</tr>
<tr>
<td>Provide outreach materials to staff &amp; visitors</td>
<td>Yes</td>
<td>As part of the awareness training provided for staff, USDA WS or other contractor will provide KSHCP outreach materials (pamphlets and flyers that contain bulleted information and graphics) to staff, harbor security, and tenants. Information will remain in each harbor vehicle that is used on and around the harbor facilities. Cruise ship visitors are provided with these or similar materials to facilitate seabird light-attraction sensitivity training and enable visitors to report their observations to appropriate personnel, either while aboard ship or in the harbor area and surrounding community.</td>
</tr>
<tr>
<td>Host Save Our Shearwaters (SOS) Aid Station</td>
<td>Partially</td>
<td>HDOT-H will provide internal SOS aid provisions, but because of security restrictions, is not able to host a public SOS aid station. Any inquiries from the public will be directed to County SOS aid stations.</td>
</tr>
<tr>
<td>Minimization Measures Considered</td>
<td>Feasible? (Y/N)</td>
<td>If Not Feasible, Provide Reason</td>
</tr>
<tr>
<td>---------------------------------</td>
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<td>--------------------------------</td>
</tr>
<tr>
<td>Change time of light use (lights off earlier)</td>
<td>Partially</td>
<td>There are no tall high-mast lights at the facility and all lights are full cut-off wall and shed mounted fixtures. Port Allen Harbor lights are on a timer and come on from dusk to dawn. The usual nighttime lighting is set to illuminate every other wall light along the pier shed. Nighttime lighting is necessary for safety and security and to meet OSHA and USCG regulations (OSHA 29 CFR 1917.123, USCG 33 CFR 126.15). The U.S. Navy PMRF has security requirements for the north pier.</td>
</tr>
<tr>
<td>Deactivate unnecessary lights</td>
<td>Partially</td>
<td>Terminal lights will be reduced to lower lighting levels during non-operational hours. Port Allen lights are on a timer and come on from dusk to dawn. The usual nighttime lighting is set to illuminate every other wall light along the pier shed. Nighttime lighting is necessary for safety and security and to meet OSHA and USCG regulations (OSHA 29 CFR 1917.123, USCG 33 CFR 126.15). HDOT will provide outreach and training to staff and harbor tenants to manage light attraction risks and to turn off external lighting when work is completed.</td>
</tr>
<tr>
<td>Replace all outdoor lights with full cut-off fixtures</td>
<td>Yes</td>
<td>Port Allen Harbor has completed a transition plan to replace outdoor lights with full cut-off fixtures in the HDOT-H-operated south pier. Full cut-off functionality for flood lights is achieved by aiming angle. The U.S. Navy is responsible for implementation on the north pier.</td>
</tr>
<tr>
<td>Shield all outdoor lights with full cut-off shields</td>
<td>Yes</td>
<td>Port Allen Harbor has completed a transition plan to replace outdoor lights with full cut-off fixtures in the HDOT-H-operated south pier. The cut-off specifications are inherent in the fixture, and no additional shielding is needed. Full cut-off functionality for some flood lights is achieved by aiming angle. HDOT-H will investigate if additional shielding may reduce horizontal light escapement within safety and security lighting requirements. The U.S. Navy is responsible for implementation on the north pier.</td>
</tr>
<tr>
<td>Angle all lights downward</td>
<td>Yes</td>
<td>Port Allen Harbor has completed a transition plan to replace outdoor lights with downward-pointing, full cut-off fixtures. Full cut-off functionality for flood lights is achieved by aiming angle.</td>
</tr>
<tr>
<td>Lower intensity (lumens) of outdoor lights</td>
<td>Partially</td>
<td>Terminal lights will be reduced to lower lighting levels during non-operational hours. Port Allen lights are on a timer and come on from dusk to dawn. The usual nighttime lighting is set to illuminate every other wall light along the pier shed. Nighttime lighting is necessary for safety and security and to meet OSHA and USCG regulations (OSHA 29 CFR 1917.123, USCG 33 CFR 126.15).</td>
</tr>
</tbody>
</table>
| Change bulb color to non-white spectrum | No | The new LED lights installed by HDOT-H are phosphor coated to 4000k and cannot be individually changed. To change the bulb color from white 4000k spectrum would require replacing the entire light fixture at a high cost. Additional research is needed on what light spectrum is not an attraction to seabirds for future lighting improvements. The HDOT-H designed its lighting to be compliant with the dark sky strategy under HRS § 201-8.5. Accordingly, the HDOT-H has worked toward light fixture designs with light cut-offs to prevent flooding or light pollution above light fixtures. The Kauai Harbors lights were designed to address one concern that may attract migratory birds. The HDOT-H will explore the use of electronic filters for lights to produce a non-white spectrum within safety and security considerations for future light improvements. HDOT-A is currently testing such light filters at Hilo Airport. Additionally, USCG and OSHA regulations (OSHA 29 CFR 1917.123; USCG 33 CFR 154.570, 127.109, 126.15) require minimum lighting standards for security and
<table>
<thead>
<tr>
<th>Minimization Measures Considered</th>
<th>Feasible? (Y/N)</th>
<th>If Not Feasible, Provide Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower height of light poles</td>
<td>No</td>
<td>Not applicable; there are no pole lights at the facility.</td>
</tr>
<tr>
<td>Prohibit/control unleashed predatory animals; prohibit outdoor feeding of animals; require sealed rubbish containers</td>
<td>Yes</td>
<td>HDOT-H will contract with USDA Wildlife Services (WS) or another contractor to conduct animal control at the harbor. Animal control includes trapping and removing stray cats and dogs roaming at the facilities. All rubbish is contained in sealed depositories that are removed routinely by the County.</td>
</tr>
<tr>
<td>Provide Worker Seabird Awareness Training to staff</td>
<td>Yes</td>
<td>HDOT will contract with USDA Wildlife Services (WS) or other contractor to provide annual seabird awareness training to all staff and tenants during August. Staff and tenants are given summary orientation that enables them to identify seabird species and written instructions on how to handle and report observations or encounters with grounded seabirds.</td>
</tr>
<tr>
<td>Provide outreach materials to staff &amp; guests</td>
<td>Yes</td>
<td>As part of the awareness training provided for staff, USDA Wildlife Services (WS) or other contractor will provide KSHCP outreach materials (pamphlets and fliers that contain bulleted information and graphics) to staff and tenants to put in staff vehicles used at the harbor. Tenants will be asked to display and share outreach materials with their customers.</td>
</tr>
<tr>
<td>Host Save Our Shearwaters (SOS) Aid Station</td>
<td>No</td>
<td>HDOT will provide seabird aid training and protocol to staff and tenants, but because this facility is open to the public and not manned 24 hours, an SOS aid station will not be set up.</td>
</tr>
</tbody>
</table>
Lihue Airport Item 7. Describe all site-specific seabird minimization measures considered for the Covered Activities. This item should follow KSHCP minimization objectives and measures as specified in the KSHCP document. Please consult with staff from the DOFAW and the USFWS as needed. The suggested tables below can be altered as needed.

Minimization measures modify the Covered Activities to reduce the effects of the activity on the Covered Species. KSHCP Participants will be required to implement minimization measures that apply to the facility to the “maximum extent practicable” per applicable state and federal laws which regulate incidental take license/permit issuance by the DLNR and the USFWS.

Minimization also entails searching and recovering grounded seabirds to minimize the chance of mortality. In addition, the presence of on-site predators (i.e., feral cats, dogs) should be controlled and removed because these animals can prey on grounded seabirds.

Provide justification, such as policies, regulations, or other rationale for measures that will not be implemented.

Minimization Alternatives Considered

The ability to modify operations at Lihue Airport is limited. Lihue Airport is classified by the FAA as a Class I Airport, certified to serve scheduled and unscheduled operations of large air carrier aircraft. As such, Lihue Airport is required to meet numerous lighting requirements specified by the FAA (see response to Lihue Airport Item 4 above) and cannot implement any measures that would prevent compliance with these standards. It also operates under an ASP approved by the TSA requiring security and safety measures be implemented at Lihue Airport. NOTE: The ASP is classified and its contents are Sensitive Security Information. Lihue Airport cannot implement measures that would preclude compliance with TSA security measures. Further safety standards established by IES, prescribe certain levels of lighting necessary to maintain public safety in airport terminals, passenger loading and unloading areas, pedestrian walkways, roadways, and parking facilities. Lihue Airport provides passenger and aircraft facilities for domestic overseas carriers, interisland carriers, commuter air taxis, air cargo, concession, tenant, and general aviation activities, with well over 100,000 aircraft operations per year. Airport operations and maintenance and servicing of aircraft occur during night hours and require adequate lighting for security and safety measures and are implemented on a 24-hour, 7 days per week basis.

HDOT-A has implemented a number of allowable minimization measures at Lihue Airport. Lihue Airport Table 4 describes these measures and explains the basis for the conclusion that other measures are not feasible.
**Lihue Airport Table 4. Seabird Light Attraction Minimization Measures Considered**

<table>
<thead>
<tr>
<th>Minimization Measures Considered</th>
<th>Feasible? (Y/N)</th>
<th>If Not Feasible to Implement Measures, Provide Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change time of light use (lights off earlier)</td>
<td>Partially</td>
<td>Lihue Airport is open 24 hours per day and 365 days per year. As a Class I airport, it services both scheduled and unscheduled large air carrier aircraft throughout the day, including during nighttime operations and emergency response. Airport lights are required for aeronautical safety by the FAA and for airport security by the TSA. FAA establishes standards for apron (ramp) area lights (FAA AC 150/5300 13A, IES RP-37-15 Outdoor Lighting for Airport Environments), requiring that lights be on and illuminate aircraft and workers on the apron when present. Shuttering off high-mast apron lights when no aircraft or workers are present is feasible to reduce seabird attraction. The Airport Operations Center turns off the high-mast apron lights when they are not required for aircraft servicing and apron operations, during the seabird fallout season (September 15 through December 15). The apron lights are turned off after the last flight has departed for the night. Airport lighting such as for passenger loading and unloading, passenger walkways, parking facilities, and roadways are open 24 hours per day and 365 days per year. Public safety standards necessitate that these areas remain lit whenever they are occupied. Internal terminal lighting in passenger holding areas visible from outside are on motion detectors that dim lights when rooms are not occupied.</td>
</tr>
<tr>
<td>Deactivate unnecessary lights</td>
<td>Partially</td>
<td>Airport lights are required for aeronautical safety by the FAA and for airport security by the TSA. FAA establishes standards for apron (ramp) area lights (FAA AC 150/5300 13A, IES RP-37-15 Outdoor Lighting for Airport Environments), requiring that lights be on and illuminate aircraft and workers on the apron when present. Shuttering off high-mast apron lights when no aircraft or workers are present is feasible to reduce seabird attraction. The Airport Operations Center turns off the high-mast apron lights when they are not required for aircraft servicing and apron operations, during the seabird fallout season (September 15 through December 15) after the last nightly flight has departed. HDOT will provide outreach and training to airport staff and tenants to manage light attraction risks and to turn off external lighting when work is completed.</td>
</tr>
<tr>
<td>Replace all outdoor lights with full cut-off fixtures</td>
<td>Partially</td>
<td>HDOT-A completed the Phase 1 lighting upgrades at Lihue Airport in 2016, with full cut-off LED fixtures (Lihue Airport Table 1) in parking area, roadway, maintenance area, terminal passenger loading and unloading areas, and baggage handling areas. Phase 2 lighting in which HDOT-A plans to install additional full cut-off (fully shielded), LED lights, including pole mounted, wall mounted, bollard type, and solar powered LED light fixtures in the T-hangers, commuter terminal, cargo terminal, FedEx buildings, and maintenance areas of the airport, and wall packs on main apron. Phase 2 is scheduled to be implemented in 2018. Full cut-off functionality for some flood lights is achieved by aiming angle. Phase 3 lighting improvements are being planned to upgrade 45 high-mast lights at the main and cargo apron (ramp) that will install full cut-off LED fixtures. A pilot project is being conducted at Hilo Airport to identify the appropriate lighting upgrade that will meet FAA and TSA safety and security requirements and incorporate any new research on lighting conditions that can reduce artificial light attraction for seabirds. The implementation of Phase 3 will depend on identification of an appropriate light fixture that improves conditions and securing funding for construction through the legislative budget process. The tentative timeline for this is 2020-2025. This measure is not applicable to taxiway and runway lights, which must comply with FAA safety regulations for specific visibility, and where the lights must be directed upward so that they can be seen by pilots operating aircraft in the movement areas (FAA AC 150/5345-46E).</td>
</tr>
<tr>
<td>Minimization Measures Considered</td>
<td>Feasible? (Y/N)</td>
<td>If Not Feasible to Implement Measures, Provide Reason</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>----------------</td>
<td>-----------------------------------------------------</td>
</tr>
<tr>
<td>Shield all outdoor lights with full cut-off shields</td>
<td>Partially</td>
<td>HDOT-A completed the Phase 1 lighting upgrades at Lihue Airport in 2016, with full cut-off fixtures (Lihue Airport Table 1) in parking area, roadway, maintenance area, terminal passenger loading and unloading areas, and baggage handling areas. Phase 2 lighting in which HDOT-A plans to install additional full cut-off (fully shielded), LED lights, including pole mounted, wall mounted, bollard type, and solar powered LED light fixtures in the T-hangers, commuter terminal, cargo terminal, FedEx building, maintenance areas of the airport. Phase 2 is scheduled to be implemented in 2018. Full cut-off functionality for some flood lights is achieved by aiming angle. HDOT-A will investigate if additional shielding may reduce horizontal light escapement within safety and security lighting requirements. Phase 3 lighting improvements are being planned to upgrade 45 high-mast lights at the main and cargo apron (ramp) that will install full cut-off LED fixtures. A pilot project is being conducted at Hilo Airport to identify the appropriate lighting upgrade that will meet FAA and TSA safety and security requirements and incorporate any new research on lighting conditions that can reduce artificial light attraction for seabirds. The implementation of Phase 3 will depend on identification of an appropriate light fixture that improves conditions and securing funding for construction through the legislative budget process. The tentative timeline for this is 2020-2025. This measure is not applicable to taxiway and runway lights, which must comply with FAA safety regulations for specific visibility, and where the lights must be directed upward so that they can be seen by pilots operating aircraft in the movement areas (FAA AC 150/5345-46E).</td>
</tr>
<tr>
<td>Angle all lights downward</td>
<td>Yes</td>
<td>HDOT-A completed the Phase 1 lighting upgrades at Lihue Airport in 2016, with full cut-off fixtures (Lihue Airport Table 1) in parking area, roadway, maintenance area, terminal passenger loading and unloading areas, and baggage handling areas. Phase 2 lighting in which HDOT-A plans to install additional full cut-off (fully shielded), LED lights, including pole mounted, wall mounted, bollard type, and solar powered LED light fixtures in the T-hangers, commuter terminal, cargo terminal, FedEx building, maintenance areas of the airport. Phase 2 is scheduled to be implemented in 2018. Phase 3 lighting improvements are being planned to upgrade 45 high-mast lights at the main and cargo apron (ramp) that will install full cut-off LED fixtures. A pilot project is being conducted at Hilo Airport to identify the appropriate lighting upgrade that will meet FAA and TSA safety and security requirements and incorporate any new research on lighting conditions that can reduce artificial light attraction for seabirds. The implementation of Phase 3 will depend on identification of an appropriate light fixture that improves conditions and securing funding for construction through the legislative budget process. The tentative timeline for this is 2020-2025. This measure is not applicable to taxiway and runway lights, which must comply with FAA safety regulations for specific visibility, and where the lights must be directed upward so that they can be seen by pilots operating aircraft in the movement areas (FAA AC 150/5345-46E).</td>
</tr>
<tr>
<td>Lower intensity (lumens) of outdoor lights</td>
<td>No</td>
<td>This measure does not provide the foot-candle illumination required by FAA for adequate safety and security lighting for servicing aircraft on active aprons (ramps) and support facilities (FAA AC 150/5300-13A, IES RP-37-15 Outdoor Lighting for Airport Environments). Additionally, lowering intensity of lighting is not applicable for taxiway and runway lights, which must comply with FAA safety regulations for specific visibility and colors of lights at different areas of runways and taxiways (FAA AC 150/5345-46E).</td>
</tr>
<tr>
<td>Change bulb color to non-white spectrum</td>
<td>No</td>
<td>The Phase 1 and Phase 2 new LED lights installed by HDOT-A are phosphor coated to 4000k and cannot be individually changed. To change the bulb color from white 4000k spectrum would require replacing the entire light fixture at a high cost; changing bulb color is not applicable for taxiway and runway lights, which must comply with FAA safety regulations for specific visibility and colors of lights at different areas of runways and taxiways (FAA AC 150/5345-46E).</td>
</tr>
<tr>
<td>Minimization Measures Considered</td>
<td>Feasible? (Y/N)</td>
<td>If Not Feasible to Implement Measures, Provide Reason</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>-----------------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>taxiways (FAA AC 150/5345-46E). Additional research is needed on what light spectrum is not an attraction to seabirds to be evaluated in future light replacement at the main and cargo aprons/ramps; where feasible and permitted under applicable rules, HDOT-A will explore the use of electronic filters for lights to produce a non-white spectrum. A pilot project is being conducted at Hilo Airport to identify the appropriate lighting upgrade that will meet FAA and TSA safety and security requirements and to incorporate any new research on lighting conditions that can reduce artificial light attraction for seabirds. The implementation of Phase 3 will depend on identification of an appropriate light fixture that improves conditions and on securing funding for construction through the legislative budget process.</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>Prohibit/control unleashed predatory animals; prohibit outdoor feeding of animals; require sealed rubbish containers</td>
<td>Yes</td>
<td>HDOT-A prohibits unleashed predatory animals such as cats and dogs and the outdoor feeding of animals on the Lihue Airport premises. The U.S. Department of Agriculture (USDA) Wildlife Services (WS) conducts animal control as part of its management responsibility. Animal control includes trapping and removing cats and conducting surveillance to detect and remove dogs that may enter the airfield and introduced barn owls that may present a hazard to aircraft operations and downed seabirds. All rubbish is contained in sealed depositories that are removed routinely by the County.</td>
</tr>
<tr>
<td>Provide Worker Seabird Awareness Training to staff</td>
<td>Yes</td>
<td>USDA WS or other contractor will provide seabird awareness training to HDOT airport staff, airport security, tenants, and contractor personnel in April prior to the seabird fallout season. HDOT airport operations workers and contract security personnel are given a summary orientation that enables them to identify seabird species under different scenarios, including in flight and grounded (alive, injured, dead), and provides written instructions on how to handle and report observations or encounters with grounded seabirds.</td>
</tr>
<tr>
<td>Provide outreach materials to staff &amp; guests</td>
<td>Yes</td>
<td>As part of the awareness training provided for staff, USDA WS or other contractor will provide KSHCP outreach materials (pamphlets and fliers that contain bulleted information and graphics) to HDOT airport staff, airport security, and tenants. HDOT fliers and information will be provided for each airport operations and security vehicle operating on airport facilities.</td>
</tr>
<tr>
<td>Host Save Our Shearwaters (SOS) Aid Station</td>
<td>Partially</td>
<td>USDA WS will provide an internal SOS aid station in the secure area of the airport, but because of security restrictions, will not be able to host a public SOS aid station. Any seabirds encountered on airport grounds will be documented, temporarily cared for, and turned over to County SOS aid stations as soon as possible. Any inquiries from the public will be directed to County SOS aid stations.</td>
</tr>
</tbody>
</table>
Kauai Harbors Item 8. Minimization Plans. Provide a plan to minimize the effects to the Covered Seabirds due to the Covered Activities. KSHCP Participants will be required to minimize the effects of the Covered Activities to the “maximum extent practicable” per applicable state and federal laws which regulate take license/permit issuance. The KSHCP document provides minimization objectives and measures to follow.

The Minimization Plans should include the proposed minimization measures, timeline, and estimated cost for each facility. In this item, the Participant can include measures already completed or in place (new lights, shields, operational changes). Timeline should include estimated completion schedule, and annual schedule for minimization that will occur only during fledging season.

For minimization measures not yet determined but anticipated to occur at the facility, this section should include an estimated cost that will be earmarked for future minimization measures.

If applicable, the Participant must provide the reasoning why certain measures will not be implemented. The suggested tables below may each be altered to best describe the Minimization Plan. Attach additional pages, photos, and drawings as needed.

Minimization plans for Nawiliwili Harbor and Port Allen Harbor are described in Kauai Harbors Tables 9-12.
## Kauai Harbors Table 9. Light Attraction Minimization Plan—Nawiliwili Harbor

<table>
<thead>
<tr>
<th>List of Buildings/Facilities</th>
<th>Minimization Measures</th>
<th>Cost to Implement</th>
<th>Responsible Staff</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Container yard pole lights—High-mast Lights</td>
<td>1. Install full cut-off fixtures&lt;br&gt;2. Reduce number of lights activated when operations not in progress</td>
<td>$843,292&lt;br&gt;$0</td>
<td>Harbors Kauai District Manager; Engineering</td>
<td>Completed 2017&lt;br&gt;2018 and ongoing</td>
</tr>
<tr>
<td>Container Yard Roadway lights</td>
<td>1. Install full cut-off fixtures&lt;br&gt;2. Reduce number of lights activated when operations not in progress</td>
<td>$4,517&lt;br&gt;$0</td>
<td>Harbors Kauai District Manager; Engineering</td>
<td>Completed 2017&lt;br&gt;2018 and ongoing</td>
</tr>
<tr>
<td>Harbor Administration Building lights</td>
<td>1. Install full cut-off fixtures&lt;br&gt;2. Reduce number of lights activated when operations not in progress</td>
<td>$79,179&lt;br&gt;$0</td>
<td>Harbors Kauai District Manager; Engineering</td>
<td>Completed 2017&lt;br&gt;2018 and ongoing</td>
</tr>
<tr>
<td>Harbor Maintenance Compound Building lights</td>
<td>1. Install full cut-off fixtures&lt;br&gt;2. Test and install additional shielding on floodlights&lt;br&gt;3. Reduce number of lights activated when operations not in progress</td>
<td>$44,610&lt;br&gt;$4,000&lt;br&gt;$0</td>
<td>Harbors Kauai District Manager; Engineering</td>
<td>Completed 2017&lt;br&gt;2018&lt;br&gt;2018 and ongoing</td>
</tr>
<tr>
<td>Warehouse Pier 2 Building lights (occupied by Matson)</td>
<td>1. Install full cut-off function&lt;br&gt;2. Test and install additional shielding on floodlights&lt;br&gt;3. Reduce number of lights activated when operations not in progress</td>
<td>$138,049&lt;br&gt;$4,000&lt;br&gt;$0</td>
<td>Harbors Kauai District Manager; Engineering</td>
<td>Completed 2017&lt;br&gt;2018&lt;br&gt;2018 and ongoing</td>
</tr>
<tr>
<td>Warehouse Pier 3 Building lights (occupied by Young Brothers)</td>
<td>1. Install full cut-off function&lt;br&gt;2. Reduce number of lights activated when operations not in progress</td>
<td>$99,913&lt;br&gt;$0</td>
<td>Harbors Kauai District Manager; Engineering</td>
<td>Completed 2017&lt;br&gt;2018 and ongoing</td>
</tr>
</tbody>
</table>
### Kauai Harbors Table 10. Light Attraction Avoidance and Minimization Plan—Port Allen Harbor

<table>
<thead>
<tr>
<th>List of Buildings/Facilities</th>
<th>Minimization Measures</th>
<th>Cost to Implement</th>
<th>Responsible Staff</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>South Pier</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Port Allen South Pier Shed Buildings</td>
<td>1. Install downward-pointing, full cut-off fixtures</td>
<td>$23,502</td>
<td>Harbors Kauai District Manager; Harbors Engineering</td>
<td>Completed 2017</td>
</tr>
<tr>
<td>Wall-pack building lights</td>
<td>2. Reduce number of lights activated.</td>
<td>$0</td>
<td></td>
<td>2018 and ongoing</td>
</tr>
<tr>
<td></td>
<td>3. Turn off external lights when work is completed.</td>
<td>$0</td>
<td></td>
<td>2018 and ongoing</td>
</tr>
<tr>
<td>Port Allen South Pier Parking Lot</td>
<td>1. Install downward-pointing fixture with full cut-off function achieved by aiming angle</td>
<td>$20,603</td>
<td>Harbors Kauai District Manager; Harbors Engineering</td>
<td>Completed 2017</td>
</tr>
<tr>
<td>Wall-pack flood lights</td>
<td>2. Test and install additional shielding on floodlights</td>
<td>$4,000</td>
<td></td>
<td>2018</td>
</tr>
</tbody>
</table>
## Kauai Harbors Table 11. Seabird Mortality Minimization Plan—Nawiliwili Harbor

<table>
<thead>
<tr>
<th>Minimization Measures</th>
<th>Describe Minimization Method (e.g., Trapping, Outreach, Enact Policy)</th>
<th>Cost to Implement</th>
<th>Responsible Staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remove and control loose predatory animals at the facility. (Loose animals can kill grounded seabirds, and this measure aims to prevent seabird mortality by animals.)</td>
<td>HDOT-H will contract with USDA WS or another contractor to conduct predator control at harbors. USDA WS will live-trap and remove feral cats and dogs from the facility during seabird fallout period (September 15–December 15).</td>
<td>$10,000</td>
<td>Harbors Kauai District Manager</td>
</tr>
<tr>
<td>Prohibit outdoor feeding of predatory animals. (Feeding animals attracts them to the site, and this measure aims to reduce the presence of animals that can cause seabird mortality.)</td>
<td>HDOT-H Kauai District Manager will enact a policy that prohibits outdoor feeding of feral cats and dogs at the facility during seabird fallout period (September 15–December 15).</td>
<td>$0</td>
<td>Harbors Kauai District Manager</td>
</tr>
</tbody>
</table>
| Conduct nightly searches to recover downed birds at the property and turn them into SOS following protocols (see monitoring plan below). | 1. HDOT-H will contract with USDA WS or another wildlife monitor to coordinate and implement an annual seabird monitoring program at Kauai harbors.  
2. HDOT-H will include seabird awareness and response activities into the contract with Nawiliwili Harbor Security Staff as part of its hourly security patrols around the facility.                                                                                               | $30,000           | Harbors Kauai District Manager                         |
|                                                                                      | $0                                                                                                                                                                                                                                                                                    |                   | Harbors Kauai District Manager                         |
| Train staff to follow minimization measures.                                         | HDOT will contract with USDA WS or another wildlife monitor to coordinate and implement an annual seabird monitoring program at Kauai harbors, including an annual training program for staff and tenants.                                                                                           | $0 (cost included in task above) | Harbors Kauai District Manager                         |
### Kauai Harbors Table 12. Seabird Mortality Minimization Plan—Port Allen Harbor

<table>
<thead>
<tr>
<th>Minimization Measures</th>
<th>Describe Minimization Method (e.g., Trapping, Outreach, Enact Policy)</th>
<th>Cost to Implement</th>
<th>Responsible Staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remove and control loose predatory animals at the facility. (Loose animals can kill grounded seabirds, and this measure aims to prevent seabird mortality by animals.)</td>
<td>HDOT-H will contract with USDA WS or another contractor to live-trap and remove feral cats and dogs from the facility during seabird fallout period (September 15–December 15).</td>
<td>$10,000</td>
<td>Harbors Kauai District Manager</td>
</tr>
<tr>
<td>Prohibit outdoor feeding of predatory animals. (Feeding animals attracts them to the site, and this measure aims to reduce the presence of animals that can cause seabird mortality.)</td>
<td>HDOT-H Kauai District Manager will enact a policy that prohibits outdoor feeding of feral cats and dogs at the facility during seabird fallout period (September 15–December 15).</td>
<td>$0</td>
<td>Harbors Kauai District Manager</td>
</tr>
<tr>
<td>Conduct nightly/morning searches to recover downed birds at the property and turn them into SOS following protocols (see monitoring plan below).</td>
<td>1. HDOT will contract with USDA WS or another wildlife monitor to coordinate and implement an annual seabird monitoring program at Kauai harbors. 2. Port Allen Harbor staff will incorporate a seabird awareness and response plan into its daily routine at the facility.</td>
<td>$30,000</td>
<td>Harbors Kauai District Manager</td>
</tr>
<tr>
<td>Train staff to follow minimization measures.</td>
<td>HDOT will contract with USDA WS or another wildlife monitor to coordinate and implement an annual seabird monitoring program at Kauai harbors, including an annual training program for staff and tenants.</td>
<td>$0 (cost included in task above)</td>
<td>Harbors Kauai District Manager</td>
</tr>
</tbody>
</table>
Lihue Airport Item 8. **Minimization Plans.** Provide a plan to minimize the effects to the Covered Seabirds due to the Covered Activities. KSHCP Participants will be required to minimize the effects of the Covered Activities to the “maximum extent practicable” per applicable state and federal laws which regulate take license/permit issuance. The KSHCP document provides minimization objectives and measures to follow.

The Minimization Plans should include the proposed minimization measures, an estimated completion schedule, and estimated cost for each facility. In this item, the Participant can include measures already completed or in place (new lights, shields, operational changes).

For minimization measures not yet determined but anticipated to occur at the facility, this section should include an estimated cost that will be earmarked to future minimization measures and a process to determine how and when those measures will be evaluated, selected, and decided (such as a cost-benefit analysis).

If applicable, the Participant must provide the reasoning why certain measures will not be implemented. The suggested tables below may each be altered to best describe the Minimization Plan. Attach additional pages, photos, and drawings as needed.

Minimization plans for Lihue Airport are described in Lihue Airport Tables 5 and 6.
**Lihue Airport Table 5. Seabird Light Attraction Minimization Plan—Lihue Airport**

<table>
<thead>
<tr>
<th>List of Buildings/features</th>
<th>Avoidance and Minimization Measures</th>
<th>Cost to Implement</th>
<th>Responsible Staff</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parking lot lights</td>
<td><strong>Minimization Measures</strong> 1. All overhead lights in the parking lot were replaced with full cut-off solar light fixtures during Phase 1 of HDOT-A’s lighting contract. 2. Phase 2 lighting upgrade. HDOT-A plans to upgrade 18 paired (36 lamps) pedestrian pathway lights in the public parking lot to bollard style, cut-off optics, solar powered LED low-level commercial pathway lighting. The upgrade is scheduled to be implemented in 2018.</td>
<td>$8,029</td>
<td>$171,565</td>
<td>Airports Kauai District Manager  Airports Kauai District Manager</td>
</tr>
<tr>
<td>Ahukini Road</td>
<td><strong>Minimization Measures</strong> 1. Lights along Ahukini Road and access road to the rental car facilities were replaced with full cut-off solar light fixtures during Phase 1 of HDOT-A lighting contract.</td>
<td>$4,003,204</td>
<td>Airports Kauai District Manager</td>
<td>Completed 2016</td>
</tr>
<tr>
<td>Signage lights</td>
<td><strong>Minimization Measures</strong> 1. HDOT-A will turn off the lighted airport entrance sign at 10:00 p.m. Lighted waterfalls will be timed to turn off at 10:00 p.m. 2. Lights are directed downward at signs and waterfalls, and there is no upward lighting.</td>
<td>$0</td>
<td>Airports Kauai District Manager  Maintenance</td>
<td>2018 Completed 2016</td>
</tr>
<tr>
<td>Main Terminal Apron, Cargo Apron, Commuter terminal lighting, helicopter maintenance lighting.</td>
<td><strong>Minimization Measures</strong> 1. HDOT-A completed the Phase 1 lighting upgrades at Lihue Airport in 2016 with full cut-off fixtures (Lihue Airport Table 1). Phase 1 included new LED terminal passenger loading and unloading areas, baggage handling areas. 2. Phase 2 lighting. HDOT-A plans to install additional full cut-off (fully shielded) LED lights, including pole-mounted and wall-mounted LED light fixtures in the T-hangers, commuter terminal, cargo terminal, FedEx buildings, maintenance areas of the airport. Phase 2 is scheduled to be implemented in 2018. 3. Test and install additional shielding on floodlights in maintenance area and at fire station. 4. Phase 3. HDOT-A plans to upgrade roughly 45 overhead high-mast lights at the main apron (ramp) and cargo main apron (ramp) with full cut-off (fully shielded) LED lights. A pilot project is being conducted at Hilo Airport to select best light characteristics. Funding would have to be secured to implement the project. Estimated completion date is 2020-2025 and would be dependent on Legislative funding. 5. The Airport Operations Center will turn off the high-mast apron lights when they are not required for airport operation during the seabird</td>
<td>$1,798,367</td>
<td>Airports Kauai District Manager</td>
<td>Completed 2016</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$1,007,749</td>
<td>Airports Kauai District Manager</td>
<td>2018</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$8,000</td>
<td>Airports Kauai District Manager</td>
<td>2018</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$1,917,386</td>
<td>Airports Kauai District Manager</td>
<td>2020-2025</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$0</td>
<td>Airports Kauai District Manager</td>
<td>2018</td>
</tr>
<tr>
<td>List of Buildings/features</td>
<td>Avoidance and Minimization Measures</td>
<td>Cost to Implement</td>
<td>Responsible Staff</td>
<td>Timeline</td>
</tr>
<tr>
<td>----------------------------</td>
<td>-------------------------------------</td>
<td>-------------------</td>
<td>------------------</td>
<td>---------</td>
</tr>
<tr>
<td></td>
<td>fallout season (September 15 through December 15). The Airport Operations Center has area control of the high-mast apron lights, rather than individual pole-level control, and is able to turn off each apron area lights when no operations are in progress. 6. Airport Operations Center will provide outreach and training to staff and airport tenants to manage light attraction risks and to turn off external lighting when work is completed.</td>
<td>$0</td>
<td>Airports Kauai District Manager</td>
<td>2018 and ongoing</td>
</tr>
<tr>
<td>Landscaping and grounds lighting</td>
<td><strong>Minimization Measures</strong> 1. All grounds and accent lights will be directed downward by grounds maintenance staff.</td>
<td>$0</td>
<td>Maintenance</td>
<td>Completed 2017</td>
</tr>
<tr>
<td>Other minimization</td>
<td>A letter requiring compliance with seabird-friendly lighting standards will be sent to airport rental tenants as part of seabird awareness training.</td>
<td>$0</td>
<td>Airports Kauai District Manager</td>
<td>2018</td>
</tr>
</tbody>
</table>
### Lihue Airport Table 6. Seabird Mortality Minimization Plan

<table>
<thead>
<tr>
<th>Minimization Measures</th>
<th>Describe Minimization Method (e.g., Trapping, Outreach, Enact Policy)</th>
<th>Cost to Implement</th>
<th>Responsible Staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remove and control loose predatory animals at the facility. (Loose animals can kill grounded seabirds, and this measure aims to prevent seabird mortality by animals.)</td>
<td>USDA WS routinely traps feral cats year-round at Lihue Airport as part of the wildlife hazard management operations. During the seabird fallout season, the control of feral cats throughout the airport improves the survival and recovery of covered seabirds that have been grounded at the airport. Trapping for mongoose also is conducted at the airport for a few weeks after a reported sighting.</td>
<td>$10,000</td>
<td>District Manager</td>
</tr>
<tr>
<td>Prohibit feeding of predatory animals. (Feeding animals attracts them to the site, and this measure aims to reduce the presence of animals that can cause seabird mortality.)</td>
<td>The HDOT-A Kauai Airport District Manager will enact a policy that prohibits outdoor feeding of feral cats and dogs at the Lihue Airport during seabird fallout season (September 15–December 15).</td>
<td>$0</td>
<td>District Manager</td>
</tr>
<tr>
<td>Conduct nightly/morning searches to recover downed birds at the property and turn them into SOS following protocols (see monitoring plan below).</td>
<td>HDOT will contract with USDA WS to implement an annual comprehensive seabird monitoring program at Lihue Airport, including the areas outside of the airport secure areas, such as the parking lot. See monitoring plan.</td>
<td>$50,000</td>
<td>District Manager</td>
</tr>
<tr>
<td>Train staff to follow minimization measures.</td>
<td>HDOT will contract with USDA WS to implement an annual training program for all staff to include seabird identification, seabird handling, and response procedures, as well as data recording and documentation techniques.</td>
<td>$0 (cost included in task above)</td>
<td>District Manager</td>
</tr>
</tbody>
</table>
Kauai Harbors Item 9. Monitoring Plan. Provide a plan to monitor take of the Covered Species at the facilities proposed to be covered by the incidental take permit/license. The monitoring plan describes how the property will be searched for downed Covered Seabirds. The KSHCP document provides standards and guidelines for take monitoring to ensure that take of the species is accurately measured and recorded.

The regulatory agencies will make the final determination as to the adequacy of the take monitoring plan.

HDOT will contract with USDA WS or another wildlife monitor to coordinate and implement an annual seabird monitoring program at Nawiliwili and Port Allen harbors. The components of the monitoring program are described in Kauai Harbors Tables 13 and 14, and the details of the monitoring protocol, data collection sheets, instructions, and maps of area monitored are provided in Appendix B.
Kauai Harbors Table 13. Covered Seabird Take Monitoring Protocols—Nawiliwili Harbor

<table>
<thead>
<tr>
<th>Item</th>
<th>Protocol (fill in protocol and provide reasons)</th>
<th>KSHCP Guideline</th>
</tr>
</thead>
</table>
| Percentage of the total property that will be searched and the total area to be searched | 1. USDA WS or other contract wildlife monitor: Driving and foot searches of harbor property during the fallout season. Combination of driving and walking survey to cover 100% of harbor property.  
2. HDOT-H contract security staff: Driving survey of 100% of secure areas of harbor property.  
3. HDOT-H operations staff and tenants: Opportunistic encounters of seabirds in active work areas during the fallout season when cargo or cruise ship operations are in progress. | Search as much area as possible |
| Frequency of searches (number of searches per day or per week) | 1. USDA WS or other contract wildlife monitor: Once nightly driving and foot searches of harbor property during the fallout season.  
2. HDOT-H security staff: Hourly driving survey of secure areas of harbor property year-round (24 times per day).  
3. HDOT-H operations staff and tenants: Opportunistic encounters of seabirds in active work areas during the fallout season when cargo or cruise ship operations are in progress. A monitoring program combining a single nightly search by a dedicated searcher, with hourly routine patrols by HDOT-H security staff provided a 90% detection rate at Nawiliwili Harbor (see Appendix C for details of Searcher Efficiency Trials at Nawiliwili Harbor). These results indicated that once-nightly searches by dedicated searchers, in conjunction with regular patrols by facility security staff, is highly effective and would meet the standard of the KSHCP. | Twice daily |
| Time of day of searches | 1. USDA WS or other contract wildlife monitor: Once nightly search of property during the fallout season, 2-3 hours after sunset.  
2. HDOT-H security staff: Hourly driving survey.  
3. HDOT-H operations staff and tenants: Opportunistic encounters of seabirds in active work areas during the fallout season, 7:00 a.m. to 10:00 p.m., when cargo or cruise ship operations are in progress. | 2-3 hours after sunset and within 3 hours after sunrise |
| Number of searchers per search area | 1. USDA WS or other contract wildlife monitor: One staff person per survey. Driving and foot survey through harbor property.  
2. HDOT-H security staff: One staff person per survey.  
3. HDOT-H operations staff and tenants: Variable number of cargo or cruise ship staff members when operations are in progress. | Depends on site conditions and safety considerations and vegetation, nearby hazards/threats |
| Proposed training | 1. USDA WS or other contract wildlife monitor: Annual training refresher with County SOS program prior to fallout season.  
2. HDOT-H security staff: Annual training prior to fallout season.  
3. HDOT-H operations staff and tenants: Annual training prior to fallout season. | Annual training covering seabird identification, seabird handling, and response procedures; verified and documented |
### Kauai Harbors Table 14. Covered Seabird Take Monitoring Protocols—Port Allen Harbor

<table>
<thead>
<tr>
<th>Item</th>
<th>Protocol (fill in protocol and provide reasons)</th>
<th>KSHCP Guideline</th>
</tr>
</thead>
</table>
| Percentage of the total property that will be searched and the total area to be searched | 1. USDA WS or other contract wildlife monitor: Foot searches of harbor property during the fallout season. Foot survey to cover 100% of harbor property.  
2. HDOT-H operations staff and tenants: Harbor agent conducts a walk-through of the south pier facilities each work day (weekends and State holidays are not included); if harbor agent is on leave, Kauai harbor master deploys another employee to conduct the walk-through. Tenants report opportunistic encounters of seabirds when commercial vessel operations are in progress. | Search as much area as possible |
| Frequency of searches (number of searches per day or per week) | 1. USDA WS or other contract wildlife monitor: Twice-daily foot searches of harbor property during the fallout season.  
2. HDOT-H operations staff and tenants: Harbor agent conducts a walk-through of the south pier facilities each work day (weekends and State holidays are not included); if harbor agent is on leave, Kauai harbor master deploys another employee to conduct the walk-through. Tenants report opportunistic encounters of seabirds in active work areas when commercial vessel operations are in progress. | Twice daily |
| Time of day of searches | 1. USDA WS or other contract wildlife monitor: Twice-daily searches of property during the fallout season, 2-3 hours after sunset and within 3 hours after sunrise.  
2. HDOT-H operations staff and tenants: Harbor agent conducts a walk-through of the south pier facilities each work day (weekends and State holidays are not included) at 7:00–7:30 a.m.; if harbor agent is on leave, Kauai harbor master deploys another employee to conduct the walk-through. Tenants report opportunistic encounters of seabirds in active work areas when commercial vessel operations are in progress. | 2-3 hours after sunset and within 3 hours after sunrise |
| Number of searchers per search area | 1. USDA WS or other contract wildlife monitor: One staff person per survey. Foot searches through harbor property.  
2. HDOT-H operations staff and tenants: Harbor agent conducts a walk-through of the south pier facilities each work day (weekends and State holidays are not included); if harbor agent is on leave, Kauai harbor master deploys another employee to conduct the walk-through. Tenants have a variable number of staff members present when commercial operations are in progress. | Depends on site conditions and safety considerations and vegetation, nearby hazards/threats |
| Proposed training | 1. USDA WS or other contract wildlife monitor: Annual training prior to fallout season.  
2. HDOT-H operations staff and tenants: Annual training prior to fallout season. | Annual training covering seabird identification, seabird handling, and response procedures; verified and documented |
Lihue Airport Item 9. Monitoring Plan. Provide a plan to monitor take of the Covered Species at the facilities proposed to be covered by the incidental take permit/license. The monitoring plan describes how the property will be searched for downed Covered Seabirds. A monitoring plan is also required for the green sea turtle if potential exist for take of that species. The KSHCP document provides standards and guidelines for take monitoring to ensure that take of the species is accurately measured and recorded.

The regulatory agencies will make the final determination as to the adequacy of the take monitoring plan.

HDOT-A will contract with USDA WS or another wildlife monitor to coordinate and implement an annual seabird monitoring program at Lihue Airport. The components of the monitoring program are described in Lihue Airport Table 7, and the details of the monitoring protocol, data collection sheets, instructions, and maps of area monitored are provided in Appendix B.
### Lihue Airport Table 7. Covered Seabird Take Monitoring Protocols—Lihue Airport

Please provide the following information for the protocol items below

<table>
<thead>
<tr>
<th>Item</th>
<th>Protocol (fill in protocol and provide reasons)</th>
<th>KSHCP Guideline</th>
</tr>
</thead>
</table>
| Percentage of the total property that will be searched and the total area to be searched | 1. USDA WS or other contract wildlife monitor: Driving and foot searches of lighted portions of airport, including main apron (ramp), main terminal (exterior) main cargo apron (ramp), heliport, maintenance compound, parking lots, Ahukini Road public access areas (see survey route map in Appendix B).  
2. HDOT-A security staff: Driving survey of 100% of public access areas. Security staff will be trained to recognize seabirds and how to address if down seabird encountered. Opportunistic encounters of seabirds during the fallout season.  
3. HDOT-A operations staff and tenants: Will be provided with information regarding seabirds and given instruction as to how to address downed birds. Opportunistic encounters of seabirds in active work areas during the fallout season. | Search as much area as possible |
| Frequency of searches (number of searches per day or per week) | 1. USDA WS or other contract wildlife monitor: Once-daily driving and foot searches of airport property by dedicated staff, plus regular patrols by WS staff throughout the day during the fallout season.  
2. HDOT-A security staff: Hourly driving survey of public access areas (24x per day). Opportunistic encounters of seabirds during the fallout season.  
3. HDOT-A operations staff and tenants: Opportunistic encounters of seabirds in active work areas during the fallout season.  
A monitoring program combining a single nightly search by a dedicated searcher, with hourly routine patrols by HDOT-H security staff provided a 90% detection rate at Nawiliwili Harbor (see Appendix C for details of Searcher Efficiency Trials at Nawiliwili Harbor). These results indicated that once-nightly searches by dedicated searchers, in conjunction with regular patrols by facility security staff, is highly effective and a similar program implemented at Lihue Airport by WS and HDOT-A staff and security would meet the standard of the KSHCP. | Twice daily |
| Time of day of searches | 1. USDA WS or other contract wildlife monitor: Once-daily dedicated search of property during the fallout season, 2-3 hours after sunset.  
2. USDA WS staff: Routine regular patrols by WS staff in morning and throughout the day.  
3. HDOT-A security staff: Hourly driving survey.  
4. HDOT-A operations staff and tenants: Opportunistic encounters of seabirds in active work areas during the fallout season. | 2-3 hours after sunset and within 3 hours after sunrise |
| Number of searchers per search area | 1. USDA WS or other contract wildlife monitor: One staff person per survey through airport property.  
2. HDOT-A security staff: One staff person per survey with two to three staff conducting survey rounds per hour.  
3. HDOT-A operations staff and tenants: Variable number of staff members when operations are in progress. | Depends on site conditions and safety considerations |
| Proposed training | 1. USDA WS or other contract wildlife monitor: Annual training refresher with County SOS program or WS or other contract wildlife monitor trainer in April, prior to fallout season.  
2. HDOT-A security staff: Annual training with WS or other contract wildlife monitor trainer in April, prior to fallout season.  
3. HDOT-A operations staff and tenants: Annual training with WS or other contract wildlife monitor trainer in April, prior to fallout season. | Annual training covering seabird identification, seabird handling, and response procedures; verified and documented |
Kauai Harbors Item 10. Components of the Green Sea Turtle Minimization and Monitoring Plan (if required). Monitoring and minimization for the green sea turtle is in two parts: A) Monitoring to detect nests and B) Monitoring and minimizing impacts to nests detected.

This section does not apply to Nawiliwili Harbor and Port Allen Harbor.

**Part A: Monitoring to detect Green Sea Turtle Nests**

Please provide the following information; the table below may be used and altered as needed.

1. Detailed location and description of beaches, including linear distance, at which searching for nests of the green sea turtle will take place. Searches should take place at any beach from which light at the facility can be viewed;

2. Monitoring protocols indicating:
   a. Annual training of searchers;
   b. Frequency of searches (every other day or as much as possible);
   c. Conduct active searching (searching the beach width);
   d. Sufficient number of trained searchers to cover the area; and
   e. Record results of search monitoring.

3. All Participants conducting self-monitoring are required to record the results of search efforts. Records should provide:
   a. Evidence (what was seen). Include description and provide photographs
   b. Location on the beach (GPS) and physically mark the location if possible
   c. Date and time of day
   d. Description of surrounding land use (e.g., vacant, or developed), and
   e. Proximity to the facility.

**Part B: Monitoring of Identified Green Sea Turtle Nests**

Each identified nest of the green sea turtle should be monitored and protected from light attraction. Please provide the following monitoring protocols; the tables below may be used and altered as needed.

1. Light avoidance measure for identified nests (either shield/deactivate lights at the facility or install and maintain a light shield around each identified nest);

2. Frequency of searches.

3. Number of searches monitoring the nests. The number of needed to monitor active nests will depend on number of nests identified and amount of beach needed to be covered;

4. Record the results of nest monitoring. Monitoring should provide:
   a. Evidence of hatchling emergence (description and photos):
   b. Date and time of emergence,
   c. Direction of tracks
   d. Condition of the nest area (e.g., disturbed or not).
**Kauai Harbors Table 15. Green Sea Turtle Take Monitoring Protocols – Part A: Monitoring to Detect Nests**

<table>
<thead>
<tr>
<th>Item</th>
<th>Protocol (fill in protocol &amp; provide reasons)</th>
<th>KSHCP Guideline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location &amp; description of the beach, or beaches, surveyed and the linear distance of the beach.</td>
<td>Not applicable</td>
<td>Beach area surveyed should coincide with visibility from the facility with the lights.</td>
</tr>
<tr>
<td>Frequency of searches (# per day or per week)</td>
<td>Not applicable</td>
<td>Every other day during nesting season (typ. May 15 to end of August)</td>
</tr>
<tr>
<td>Number of searchers per search area</td>
<td>Not applicable</td>
<td>Depends on site conditions and safety considerations</td>
</tr>
<tr>
<td>Proposed training</td>
<td>Not applicable</td>
<td>Searchers should receive annual training conducted by the DLNR or the USFWS, or their designee.</td>
</tr>
</tbody>
</table>

**Kauai Harbors Table 16. Green Sea Turtle Take Monitoring Protocols – Part B: Monitoring of Identified Nests & Minimization**

<table>
<thead>
<tr>
<th>Item</th>
<th>Protocol (fill in protocol &amp; provide reasons)</th>
<th>KSHCP Guideline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency of checks (# per day or per week)</td>
<td>Not applicable</td>
<td>Active nests should be monitored every 1-2 days; then daily during expected hatching date</td>
</tr>
<tr>
<td>Light avoidance</td>
<td>Not applicable</td>
<td>If lights cannot be deactivated or shielded from the nest, each nest should be screened from visible light.</td>
</tr>
<tr>
<td>Number of searchers per search area</td>
<td>Not applicable</td>
<td>Depends on site conditions and safety considerations</td>
</tr>
</tbody>
</table>
Lihue Airport Item 10. Components of the Green Sea Turtle (Honu) Minimization and Monitoring Plan (if required). Monitoring and minimization for the green sea turtle is in two parts: A) Monitoring to detect nests and B) Monitoring and minimizing impacts to nests detected.

This section does not apply to Lihue Airport.

**Part A: Monitoring to detect Green Sea Turtle Nests**

Please provide the following information; the table below may be used and altered as needed.

1. Detailed location and description of beaches, including linear distance, at which searching for nests of the green sea turtle will take place. Searches should take place at any beach from which light at the facility can be viewed;

2. Monitoring protocols indicating:
   a. Annual training of searchers;
   b. Frequency of searches (every other day or as much as possible);
   c. Conduct active searching (searching the beach width);
   d. Sufficient number of trained searchers to cover the area; and
   e. Record results of search monitoring.

3. All Participants conducting self-monitoring are required to record the results of search efforts. Records should provide:
   a. Evidence (what was seen). Include description and provide photographs
   b. Location on the beach (GPS) and physically mark the location if possible
   c. Date and time of day
   d. Description of surrounding land use (e.g., vacant, or developed), and
   e. Proximity to the facility.

**Part B: Monitoring of Identified Green Sea Turtle Nests**

Each identified nest of the green sea turtle should be monitored and protected from light attraction. Please provide the following monitoring protocols; the tables below may be used and altered as needed.

1. Light avoidance measure for identified nests (either shield/deactivate lights at the facility or install and maintain a light shield around each identified nest);

2. Frequency of searches.

3. Number of searches monitoring the nests. The number of needed to monitor active nests will depend on number of nests identified and amount of beach needed to be covered;

4. Record the results of nest monitoring. Monitoring should provide:

   a. Evidence of hatchling emergence (description and photos):
   b. Date and time of emergence,
   c. Direction of tracks
   d. Condition of the nest area (e.g., disturbed or not).
### Lihue Airport Table 8. Green Sea Turtle Take Monitoring Protocols – Part A: Monitoring to Detect Nests

Please provide search protocols for detecting nests of the green sea turtle (Attach pages as needed)

<table>
<thead>
<tr>
<th>Item</th>
<th>Protocol (fill in protocol and provide reasons)</th>
<th>KSHCP Guideline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location and description of the beach, or beaches, surveyed and the linear distance of the beach.</td>
<td>Not applicable</td>
<td>Beach area surveyed should coincide with visibility from the facility with the lights.</td>
</tr>
<tr>
<td>Frequency of searches (# per day or per week)</td>
<td>Not applicable</td>
<td>Every other day during nesting season (typ. May 15 to end of August)</td>
</tr>
<tr>
<td>Number of searchers per search area</td>
<td>Not applicable</td>
<td>Depends on site conditions and safety considerations</td>
</tr>
<tr>
<td>Proposed training</td>
<td>Not applicable</td>
<td>Searchers should receive annual training conducted by the DLNR or the USFWS, or their designee.</td>
</tr>
</tbody>
</table>

### Lihue Airport Table 9. Green Sea Turtle Take Monitoring Protocols – Part B: Monitoring of Identified Nests and Minimization

Please provide search protocols to monitor identified nests (from Part A) of the green sea turtle (Attach pages as needed)

<table>
<thead>
<tr>
<th>Item</th>
<th>Protocol (fill in protocol and provide reasons)</th>
<th>KSHCP Guideline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency of searches (# per day or per week)</td>
<td>Not applicable</td>
<td>Active nests should be monitored every 1-2 days; then daily during expected hatching date</td>
</tr>
<tr>
<td>Light avoidance</td>
<td>Not applicable</td>
<td>If lights cannot be deactivated or shielded from the nest, each nest should be screened from visible light.</td>
</tr>
<tr>
<td>Number of searchers per search area</td>
<td>Not applicable</td>
<td>Depends on site conditions and safety considerations</td>
</tr>
</tbody>
</table>
Kauai Harbors Item 11. Describe the schedule that will be followed to provide training for staff. Training must be provided to those that will conduct and oversee the searches at the facility.

The training should include:

1. Summary of regulations protecting the Covered Species;
2. Search procedures, route, frequency and timing specific to the facility’s monitoring plan, for seabirds and green sea turtle nests (if applicable);
3. Response procedures including safe and proper techniques for handling seabirds;
4. Recognizing evidence of green sea turtle nests, proper nest light screening, and hatching activity (if green sea turtle minimization and monitoring plan is applicable);
5. Procedures to document the results of searches;
6. Downed wildlife agency contacts; and
7. Nearest SOS aid station.

USDA WS or other wildlife monitor, under contract with HDOT-H, will provide annual Worker Seabird Awareness and Response Training (WSART) to the Kauai District harbor operations staff, and contract security staff who may encounter fallen seabirds in the performance of their duties. The training will take place during the month of August, before the start of each seabird fall out season (September 15 to December 15). The training will cover the regulatory setting; consequences for noncompliance; standard monitoring, response, and reporting procedures; techniques for proper handling of fallen seabirds; personal protection; agency contacts; and facility locations. The training will incorporate an annual refresher update from the County SOS program.

All recipients of training will sign an attendance sheet, and HDOT will submit the forms with its annual compliance reporting.

The seabird fallout training, including proper handling and care instructions and reporting procedures, will be provided to the following HDOT-H staff:

Nawiliwili Harbor

- Harbors District Manager
- Harbors Assistant Manager
- Harbor Operations
- Harbor Security Officer
- Engineer
- Maintenance Supervisor
- Harbor Agent
- Maintenance Staff
- Contract Security Staff
- USDA Wildlife Services Staff or Contract Monitoring Staff

Port Allen Harbor

- Harbor Agent
• USDA Wildlife Services Staff or Contract Monitoring Staff

**Rescuing Downed Seabirds—Standard Operating Procedures (SOP)**

The following steps provide the procedure for recovering downed seabirds:

1. Take the seabird recovery kit and pet carrier to the downed seabird.
2. Put on gloves.
3. Using towel to gently cover the bird, pick up the seabird.
4. Place the seabird in the pet carrier, and close the pet carrier.
5. Put the gloves and towel back in the seabird rescue kit.
6. Take the bird and pet carrier to an SOS Aid Station.
7. Transfer the bird to the Aid Station’s pet carrier.
8. Call SOS at 632-0610 or 635-5117.
9. Return the seabird rescue kit and pet carrier.
11. Give the completed “Bird Take Field Report” to the General Manager, or other responsible staff person at the facility.

**Contents of Seabird Recovery Kit**

1. Latex or nitrile gloves;
2. Three towels;
3. Hand sanitizer;
4. Flashlight or headlamp;
5. Clipboard, pen, and blank “Bird Take Field Reports”, or similar form; and
6. Pet carrier – medium sized. If a box is used it must be well ventilated and marked conspicuously “LIVE ANIMAL”.

**Lihue Airport Item 11.** Describe the schedule that will be followed to provide training for staff. Training must be provided to those that will conduct and oversee the searches at the facility.

The training should include:

1. Summary of regulations protecting the Covered Species;
2. Search procedures, route, frequency, and timing specific to the facility’s monitoring plan, for seabirds and green sea turtle nests;
3. Response procedures including safe and proper techniques for handling seabirds;
4. Recognizing evidence of green sea turtle nests (if lights shine on a beach), proper nest light screening, and hatchling activity (e.g., emergence);
5. Procedures to document the results of searches;
6. Downed wildlife agency contacts; and
7. Nearest SOS aid station.

USDA WS or other wildlife monitor, under contract with HDOT-A, will provide annual Worker Seabird Awareness and Response Training (WSART) to the Kauai District airport operations staff, and contract security staff who may encounter fallen seabirds in the performance of their duties. The training will take place during the month of April, before the start of each seabird fallout season.
(September 15 to December 15). The training will cover the regulatory setting; consequences for noncompliance; standard monitoring, response, and reporting procedures; techniques for proper handling of fallen seabirds; personal protection; agency contacts; and facility locations. The training will incorporate an annual refresher update from the County SOS program.

All recipients of training will sign an attendance sheet, and HDOT will submit the forms with its annual compliance reporting.

The seabird fallout training, including proper handling and care instructions, and reporting procedures will be provided to the following HDOT-A staff:

- Airports District Manager
- Assistant Air Superintendent V
- Assistant Air Superintendent VI
- Security
- Airport Operations Controller
- Airports Operations Controller II
- Contract Security Staff
- USDA Wildlife Services Staff or Contract Monitoring Staff

**Rescuing Downed Seabirds—Standard Operating Procedures (SOP)**

The following steps provide the procedure for recovering downed seabirds:

1. Take the seabird recovery kit and pet carrier to the downed seabird.
2. Put on gloves.
3. Using towel to gently cover the bird, pick up the seabird.
4. Place the seabird in the pet carrier, and close the pet carrier.
5. Put the gloves and towel back in the seabird rescue kit.
6. Take the bird and pet carrier to an SOS Aid Station.
7. Transfer the bird to the Aid Station’s pet carrier.
8. Call SOS at 632-0610 or 635-5117.
9. Return the seabird rescue kit and pet carrier.
11. Give the completed “Bird Take Field Report” to the USDA WS staff or District Manager.

**Contents of Seabird Recovery Kit**

1. Latex or nitrile gloves
2. Three towels
3. Hand sanitizer
4. Flashlight or headlamp
5. Clipboard, pen, and blank “Bird Take Field Reports,” or similar
6. Pet carrier—medium sized. If a box is used, it must be well ventilated and marked conspicuously “LIVE ANIMAL”
Kauai Harbors Item 12. Describe any outreach conducted (e.g., handing out pamphlets on seabird awareness to facility employees or guests):

HDOT-H will display SOS posters and provide outreach materials to staff and tenants annually during the fallout season (September 15–December 15).

Lihue Airport Item 12. Describe any outreach conducted (e.g., handing out pamphlets on seabird awareness to facility employees or guests):

HDOT-A will display SOS posters and provide outreach materials to staff and tenants annually during the fallout season (September 15–December 15).
PART 2. Take Estimate, Requested Amount of Take Authorization, and Funding

Kauai Harbors Item 1. Show the calculation of estimated take for each of the Covered Species.

Following the take estimation methods in the KSHCP for estimating a Participant’s take, the tables and charts below show the take estimate calculation for the facility for each of the Covered Seabirds.

The KSHCP take estimate method utilizes the average of the most recent 5 years of SOS recovery data for the facility. Applied to the data is an adjustment for downed birds not found, assumed at 50 percent.

If the landowner-applicant submits a take estimate with an alternate discovery rate, they must provide the reasons why an alternate rate was used to estimate take, including relevant information supporting their reasoning.

Kauai Harbors Table 17. Annual Take Estimate Calculation for Nawiliwili Harbor

<table>
<thead>
<tr>
<th>Participant/Facility Name: Nawiliwili Harbor</th>
<th>Newell’s Shearwater</th>
<th>Hawaiian Petrel</th>
<th>Band-rumped Storm Petrel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avg. from SOS data—monitoring data if available (5 most recent yrs.: 2013-2017 for Newell’s Shearwater and 2003-2017 for Hawaiian Petrel and Band-rumped Storm Petrel)</td>
<td>1.8</td>
<td>0.2</td>
<td>0.0</td>
</tr>
<tr>
<td>Adjustment for unobserved (50% typical) as per SEEF Trials – Appendix C</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>Total direct take from light attraction</td>
<td>2.0</td>
<td>0.22</td>
<td>0.0</td>
</tr>
<tr>
<td>Annual Take Estimate</td>
<td>2.0</td>
<td>0.22</td>
<td>0.0</td>
</tr>
</tbody>
</table>

1 Average take for Covered Species was based on a combination of information provided in a memo from KSHCP dated April 21, 2016 for the period 2003-2010, SOS data for 2011-2016, SOS data for 2017, and HDOT self-monitoring results for 2017. See Appendix D for a summary of monitoring results for HDOT properties in 2017, and Appendix E for a summary of fall out records used to determine average annual take at each facility.

2 The average take number for Hawaiian Petrel was reported as a combined take for Nawiliwili Harbor and Port Allen Harbor, and totaled one bird in 2003 and 2008. Pending receipt of SOS data with which to clarify the location, it is assumed that both fallout records occurred at Nawiliwili Harbor. One additional Hawaiian Petrel was recorded at Nawiliwili in 2017 yielding a 15-year total of 3 birds, or an annual average of 0.2 bird per year.

Kauai Harbors Table 18. Annual Take Estimate Calculation for Port Allen Harbor

<table>
<thead>
<tr>
<th>Participant/Facility Name: Port Allen Harbor</th>
<th>Newell’s Shearwater</th>
<th>Hawaiian Petrel</th>
<th>Band-rumped Storm Petrel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avg. from SOS data—monitoring data if available (5 most recent yrs.: 2013-2017 for Newell’s Shearwater and 2003-2017 for Hawaiian Petrel and Band-rumped Storm Petrel)</td>
<td>2.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Adjustment for unobserved (50% typical)</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Total direct take from light attraction</td>
<td>4.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Annual Take Estimate</td>
<td>4.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

1 Average take for Covered Species was based on a combination of information provided in a memo from KSHCP dated April 21, 2016 for the period 2003-2010, SOS data for 2011-2016, SOS data for 2017, and HDOT self-monitoring results for 2017. See Appendix D for a summary of monitoring results for HDOT properties in 2017, and Appendix E for a summary of fall out records used to determine average annual take at each facility.
Lihue Airport Item 1. Show the calculation of estimated take for each of the Covered Species.

Following the take estimation methods in the KSHCP for estimating a Participant’s take, the tables and charts below show the take estimate calculation for the facility for each of the Covered Seabirds.

The KSHCP take estimate method utilizes the average of the most recent 5 years of SOS recovery data for the facility. Applied to the data is an adjustment for downed birds not found, assumed at 50 percent.

If the landowner-applicant submits a take estimate with an alternate discovery rate, they must provide the reasons why an alternate rate was used to estimate take, including relevant information supporting their reasoning.

Lihue Airport Table 10. Annual Take Estimate Calculation for Lihue Airport

<table>
<thead>
<tr>
<th>Participant/Facility Name: Lihue Airport</th>
<th>Newell’s Shearwater</th>
<th>Hawaiian Petrel</th>
<th>Band-rumped Storm Petrel$^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avg. from SOS data—or—monitoring data if available (5 most recent yrs.: 2013-2017 for Newell’s Shearwater and 2003-2017 for Hawaiian Petrel and Band-rumped Storm Petrel)$^1$</td>
<td>1.6</td>
<td>0.2</td>
<td>0.07</td>
</tr>
<tr>
<td>Adjustment for unobserved (50% typical, an adjustment of 25% unobserved is proposed for Lihue Airport based on the 90% searcher efficiency rates obtained in SEEF Trials at Nawiliwili Harbor (Appendix C) under similar conditions, staffing coverage, procedures, and monitoring frequency).</td>
<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
</tr>
<tr>
<td>Total direct take from light attraction</td>
<td>2.13</td>
<td>0.27</td>
<td>0.09</td>
</tr>
<tr>
<td>Annual Take Estimate</td>
<td>2.13</td>
<td>0.27</td>
<td>0.09</td>
</tr>
</tbody>
</table>

$^1$ Average take for Covered Species was based on a combination of information provided in a memo from KSHCP dated April 21, 2016 for the period 2003-2010, SOS data for 2011-2016, SOS data for 2017, and HDOT self-monitoring results for 2017. See Appendix D for a summary of monitoring results for HDOT properties in 2017, and Appendix E for a summary of fall out records used to determine average annual take at each facility.

$^2$ Information provided in a memo from KSHCP dated April 21, 2016 detailed one fallout record of a Band-rumped Storm Petrel at Lihue Airport in 2007. The values used in the table are reproduced from the April 21, 2016 memo. Note that USDA Wildlife Services recovery records for Lihue Airport do not show recoveries for this species.

Kauai Harbors Item 2. Select the requested take authorization and permit/license term coverage for each of the Covered Species.

Kauai Harbors Table 19. Requested take authorization and permit/license term coverage for ‘a ‘o - Newell’s Shearwater (Puffinus Newelli) for Nawiliwili Harbor

<table>
<thead>
<tr>
<th>Age Class</th>
<th>Annual Take Estimate: Fledglings</th>
<th>Annual Take Estimate: Adults or sub-adults</th>
<th>Take Limit for License/Permit Term (30 yrs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortality (Lethal) (Lethal take = 10% undiscovered birds + 12% SOS birds that are not released = 22% of total take)</td>
<td>0.42</td>
<td>0.0</td>
<td>12.6</td>
</tr>
<tr>
<td>Injury (Non-lethal) (Annual take estimate – lethal take estimate)</td>
<td>1.58</td>
<td>0.0</td>
<td>47.4</td>
</tr>
</tbody>
</table>
Kauai Harbors Table 20. Requested take authorization and permit/license term coverage for ‘a ‘o - Newell’s Shearwater (*Puffinus Newelli*) at Port Allen Harbor

<table>
<thead>
<tr>
<th>Age Class</th>
<th>Annual Take Estimate: Fledglings</th>
<th>Annual Take Estimate: Adults or sub-adults</th>
<th>Take Limit for License/Permit Term (30 yrs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortality (Lethal) (Lethal take = 50% undiscovered birds + 12% SOS birds that are not released = 62% of total take)</td>
<td>2.24</td>
<td>0.0</td>
<td>67.2</td>
</tr>
<tr>
<td>Injury (Non-lethal) (Annual take estimate – lethal take estimate)</td>
<td>1.76</td>
<td>0.0</td>
<td>52.8</td>
</tr>
</tbody>
</table>

Kauai Harbors Table 21. Requested take authorization and permit/license term coverage for ‘ua‘u – Hawaiian Petrel (*Pterodroma sandwichensis*) at Nawiliwili Harbor

<table>
<thead>
<tr>
<th>Age Class</th>
<th>Annual Take Estimate: Fledglings</th>
<th>Annual Take Estimate: Adults or sub-adults</th>
<th>Take Limit for License/Permit Term (30 yrs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortality (Lethal) (Lethal take = 10% undiscovered birds + 12% SOS birds that are not released = 22% of total take)</td>
<td>0.04</td>
<td>0.0</td>
<td>1.2</td>
</tr>
<tr>
<td>Injury (Non-lethal) (Annual take estimate – lethal take estimate)</td>
<td>0.18</td>
<td>0.0</td>
<td>5.4</td>
</tr>
</tbody>
</table>

Lihue Airport Item 2. Select the requested take authorization and permit/license term coverage for each of the Covered Species.

Lihue Airport Table 11. Requested take authorization and permit/license term coverage for ‘a ‘o - Newell’s Shearwater (*Puffinus Newelli*) for Lihue Airport

<table>
<thead>
<tr>
<th>Age Class</th>
<th>Annual Take Estimate: Fledglings</th>
<th>Annual Take Estimate: Adults or sub-adults</th>
<th>Take Limit for License/Permit Term (30 yrs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortality (Lethal) (Lethal take = 25% undiscovered birds + 12% SOS birds that are not released = 37% of total take)</td>
<td>0.72</td>
<td>0.0</td>
<td>21.6</td>
</tr>
<tr>
<td>Injury (Non-lethal) (Annual take estimate – lethal take estimate)</td>
<td>1.41</td>
<td>0.0</td>
<td>42.3</td>
</tr>
</tbody>
</table>

Lihue Airport Table 12. Requested take authorization and permit/license term coverage for ‘ua‘u – Hawaiian Petrel (*Pterodroma sandwichensis*) for Lihue Airport

<table>
<thead>
<tr>
<th>Age Class</th>
<th>Annual Take Estimate: Fledglings</th>
<th>Annual Take Estimate: Adults or sub-adults</th>
<th>Take Limit for License/Permit Term (30 yrs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortality (Lethal) (Lethal take = 25% undiscovered birds + 12% SOS birds that are not released = 37% of total take)</td>
<td>0.09</td>
<td>0.0</td>
<td>2.7</td>
</tr>
<tr>
<td>Injury (Non-lethal) (Annual take estimate – lethal take estimate)</td>
<td>0.18</td>
<td>0.0</td>
<td>5.4</td>
</tr>
</tbody>
</table>
Lihue Airport Table 13. Requested take authorization and permit/license term coverage for ‘akē‘akē – Band-Rumped Storm Petrel (Oceanodroma castro) for Lihue Airport

<table>
<thead>
<tr>
<th>Age Class</th>
<th>Annual Take Estimate: Fledglings</th>
<th>Annual Take Estimate: Adults or sub-adults</th>
<th>Take Limit for License/Permit Term (30 yrs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortality (Lethal) (Lethal take = 25% undiscovered birds + 12% SOS birds that are not released = 37% of total take)</td>
<td>0.03</td>
<td>0.0</td>
<td>0.9</td>
</tr>
<tr>
<td>Injury (Non-lethal) (Annual take estimate – lethal take estimate)</td>
<td>0.06</td>
<td>0.0</td>
<td>1.8</td>
</tr>
</tbody>
</table>

Note: USDA WS take records for LIH do not show recoveries for this species.

Kauai Harbors Item 3. Funding Assurance. Provide proof of adequate funding (see KSHCP document). All participants must demonstrate requisite funding prior to permit/license approval to ensure that the proposed measures and actions, including monitoring, will be undertaken in accordance with the terms and schedule of the KSHCP. HDOT is statutorily required to generate its own funds for its transportation programs and projects. Independent special funds were thus established for each division. Special funds strive to generate sufficient revenues for program operations, maintenance, and capital improvement costs, and are dependent on revenue generated by facilities operations and tenants.

HDOT-H will provide funding for implementation of the KSHCP from its Harbors Special Fund (B). The amount needed to fund HDOT-H’s obligation will be included in the Harbors Division biennium and supplemental budget requests and is limited to the amounts approved in the legislative approval process for those specific fiscal periods. No funds beyond specific fiscal years can be appropriated without legislative approval. HDOT-H will make annual budget requests consistent with the budget approved as part of the KSHCP.

NOTE: HDOT-H is proposing that funds normally used to satisfy the “recovery” provisions of Hawaii Revised Statutes 195D be directed to scientific research on lighting.

The applicant shall post a bond, provide an irrevocable letter of credit, insurance, or surety bond, or provide other similar financial tools, including depositing a sum of money in the endangered species trust fund created by section 195D-31, or provide other means approved by the board, adequate to ensure monitoring of the species by the State and to ensure that the applicant takes all actions necessary to minimize and mitigate the impacts of the take.
Lihue Airport Item 3. Funding Assurance. Provide proof of adequate funding (see KSHCP document). All participants must demonstrate requisite funding prior to permit/license approval to ensure that the proposed measures and actions, including monitoring, will be undertaken in accordance with the terms and schedule of the KSHCP

HDOT-A is statutorily required to generate its own funds for its transportation programs and projects. Independent special funds were thus established for each of the division’s major programs. Each fund strives to generate sufficient revenues for program operation, maintenance costs, and the State General Fund fee for central services. This fee is set at five percent of each special fund’s gross revenues after debt service.

These special funds must also provide a higher level of cash financing in the Capital Improvement Program to ease the burden on debt service. Since the Capital Improvement Program is large, HDOT-A continues to rely on reimbursable General Obligation Bonds and federal aid (largely through the U.S. Department of Transportation’s FAA) to help finance its programs and projects.

**Airport Special Revenue Fund**

The Airport Special Revenue Fund was created under Section 261-5, Hawaii Revised Statutes. Its primary revenue sources are the aviation fuel tax, landing fees, airport use charges, concession fees, and investment income. Other revenue sources include rentals and miscellaneous earnings.

HDOT-A will provide funding for implementation of the KSHCP from its Airport Special Revenue Fund (B). The amount needed to fund HDOT-A’s obligation will be included in the HDOT-A biennium and supplemental budget requests and is limited to the amounts approved in the legislative approval process for those specific fiscal periods. No funds beyond specific fiscal years can be appropriated without legislative approval. HDOT will make annual budget requests consistent with the budget approved as part of the KSHCP.

Note: HDOT-A is proposing that funds normally used to satisfy the “recovery” provisions of Hawaii Revised Statutes 195D be directed to scientific research on lighting.

The State of Hawaii cannot commit funds that have not been approved by the Legislature, so a provision in the PIP and HCP must be noted that any type of payment is based on approval and availability.

Signature of Participant: ____________________________

Printed Name: ____________________________ Date: __________________

The undersigned affirms that all the information included is true and accurate to the best of the Participant’s knowledge and that this PIP is voluntarily submitted.

☐ check to waive confidentiality

2 The applicant shall post a bond, provide an irrevocable letter of credit, insurance, or surety bond, or provide other similar financial tools, including depositing a sum of money in the endangered species trust fund created by section 195D-31, or provide other means approved by the board, adequate to ensure monitoring of the species by the State and to ensure that the applicant takes all actions necessary to minimize and mitigate the impacts of the take.
Contact Us

Call the KSHCP Office at (808) 245-9160 or visit our office at 4272-B Rice Street, Lihue HI, 96766. Visit the project website: www.Kauai-seabirdhcp.info. We look forward to working with you toward helping Hawaii’s unique species!
### Kauai Harbors PIP Completion Checklist Form

<table>
<thead>
<tr>
<th>Item</th>
<th>Completion Check</th>
<th>Information Needed to Make Item Complete or Outstanding Issues Remaining</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Completion Check</td>
<td>Is each item thoroughly described and information submitted?</td>
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#### Part I: Landowner & Property Information; Description of the Facilities; Avoidance & Minimization Measures; Monitoring of Take

1. **Landowner applicant information**  
   - Landowner name/organization  
   - Contact information

2. **Property & Facility description**  
   - TMK or Legal description  
   - Maps, site plans.  
   - Narrative Description

3. **Covered Activities**  
   - Light table/inventory  
   - Honu assessment  
   - Description of Utility structures & support structures  
   - Maps, site plans, photos.  
   - Heights and configurations

4. **Standards for Covered Activities**  
   - Regulations provided  
   - Operational needs

5. **Future facility plans**  
   - Proposed plans provided  
   - Site plans, arch drawings,  
   - Other information

6. **Alternatives to the Taking**  
   - Alternatives addressed  
   - Reasons provided

7. **Minimization measures considered**  
   - Minimization measures table (or other info.) completed  
   - Reasons provided  
   - Each Covered Activity  
   - Covered Seabirds and Honu

8. **Minimization plan**  
   - Minimization measures provided  
   - Timeline and funding  
   - Plan and process for future minimization measures (e.g., cost-benefit, earmarked funding)  
   - Each Covered Activity (lights & utility)  
   - Covered Seabirds and Honu

9. **Monitoring Plan**  
   - Selected self-monitoring or DLNR  
   - Completed plan with protocols  
   - Adequate protocols  
   - Each Covered Activity  
   - Covered Seabird & Honu  
   - Training for searchers

#### Part II: Take Estimate, Requested Amount of Take Authorization, and Funding

1. **Take Estimate Calculation**  
   - 5-year SOS average  
   - Discovery rate  
   - Covered Seabirds  
   - Honu

2. **Requested take authorization & permit term**  
   - Each Covered Species  
   - Reason provided for discrepancy between estimate and requested amount
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### Part I: Landowner & Property Information; Description of the Facilities; Avoidance & Minimization Measures; Monitoring of Take

1. **Landowner applicant information**
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   - Each Covered Activity (lights & utility)
   - Covered Seabirds and Honu

9. **Monitoring Plan**
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   - Completed plan with protocols
   - Adequate protocols
   - Each Covered Activity
   - Covered Seabird & Honu
   - Training for searchers

### Part II: Take Estimate, Requested Amount of Take Authorization, and Funding

1. **Take Estimate Calculation**
   - 5-year SOS average
   - Discovery rate
   - Covered Seabirds
   - Honu
|   | Requested take authorization & permit term | Each Covered Species  
<table>
<thead>
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<th>Reason provided for discrepancy between estimate and requested amount</th>
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</thead>
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| 3 | Proof of Adequate Funding                | Financial mechanism  
|   |                                           | Demonstrated ability to fund                                       |
|   | Signature                                | Signed by landowner, facility owner, or authorized responsible party |
|   |                                          |                                                                     |
Lighting Material Manuals

Nawiliwili Harbor
HDOT Harbors, Highways, & Tunnels

JCI Contract: 4PX0-0031
<table>
<thead>
<tr>
<th>Part Name</th>
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<td>GE - LIGHTGRID NODE BOX ASSY 277V</td>
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<td>CR14-22L-40K-10V</td>
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<tr>
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<td>LLW4-40-LW-F-U</td>
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## TABLE OF CONTENTS

### Catalog

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<td>SIL-1X4-XL-F-UL-40K-CW8-JP</td>
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<td>Precision</td>
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<td>RAB</td>
<td>WPLED 13N/PC2</td>
<td>WPLED13N/PC2</td>
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</table>
GE Lighting

LightGrid™ Gateway
Outdoor Wireless Control System

Description
LightGrid™ Outdoor Wireless Control System from GE allows remote monitoring and control, utility-grade energy measurement and GPS mapping of streetlights.

Product Features
• GPS module in every gateway
• Automatic gateway registration and display in MAP view
• Real-time update of the status of all the fixtures
• Self-forming & self-restoring mesh network
• Addressable via IPv6
• Nodes, gateway can be spaced up to 500m apart (Clear line of sight)
• Reliable and Secure Encrypted Communications

Applications
• Street Lighting
• Area Lighting

Product Specifications
• Input Voltage: 120-277V, 347V—480V
• Operating Temperature: -40 to +50°C
• Surge: Meets ANSI C62.41 6KV, 3KA Combination Wave
• Power Consumption: < 3W
• Frequency: 915 MHz ISM Band
• GPS: Accuracy 3m (clear open sky)
• Addressing: IPv6
• Security: AES Encryption, Certificate Based
• Network Communication: IEEE 802.15.4, 6LoWPAN, 50 Channel FHSS
• Backhaul Communication: Ethernet or Cell (with modem)
• Complies with FCC Part 15 Required Sub Sections
• Complies with UL 916
• Weight: 7 lbs.
• Warranty: 3 years

Product Dimensions
Installation

**Gateway** will contain two ¾" liquid-tight conduit fittings, and three liquid-tight glands to accommodate customer installation flexibility according to the diagram below, which may require customer to cap or seal unused fittings during installation.

Packaging

- 1 Gateway Enclosure
- Conduit fittings (2 pcs mounted to enclosure)
- Gland fittings (3 pcs mounted to enclosure)
- GPS module and cable (1 pcs mounted to gland)
- Antenna Cable (1 pc mounted to gland)
- Antenna Pole (1 pc to be installed)
- Pole Mounting Bracket (2 pcs mounted to enclosure)

Ordering Number Logic

<table>
<thead>
<tr>
<th>E L W G</th>
<th>VOLTAGE (UL)</th>
<th>ANTENNA</th>
<th>COUNTRY/POLE</th>
<th>GPS</th>
<th>IP COMMUNICATION</th>
<th>NETWORK CONFIGURATION</th>
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</thead>
<tbody>
<tr>
<td>E L W G</td>
<td>B = 120/277</td>
<td>C = Standard 18&quot;</td>
<td>XX = Default (US)</td>
<td>G = GPS Capability</td>
<td>C = Cat 5 Cable Only</td>
<td>B = Network B None = Default</td>
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</tbody>
</table>

www.gelighting.com

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LightGrid™ Cell Modem
Outdoor Wireless Control System

Description
LightGrid™ Outdoor Wireless Control System from GE allows remote monitoring and control, utility-grade energy measurement and GPS mapping of streetlights.

Specifications
- Input Voltage: 120-277V, 347V—480V
- Weight: 8 lbs
- Dimensions: 15 in. x 13 in. x 7 in
- Mounting Height: 27 ft.–40 ft.
- Warranty: 3 years

Cell Based Network

Packaging
- Cellular enclosure (1pc)
- Conduit fitting (2pcs, mounted to enclosure)
- Flexible conduit (2pc)
- Power cable, stripped ends (1pc)
- Ethernet cable (1pc)
- Pole mounting bracket (2pcs, mounted to enclosure)

Applications
- Street Lighting
- Area Lighting

Ordering Number Logic

<table>
<thead>
<tr>
<th>PRODUCT ID</th>
<th>VOLTAGE</th>
<th>IP COMMUNICATION</th>
<th>FUTURE USE</th>
<th>PROVIDER</th>
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<tbody>
<tr>
<td>E L W M</td>
<td>0 = 120-277</td>
<td>C = CAT 5 Cable only</td>
<td>X</td>
<td>V = Verizon</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>R = Rogers</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X = Future Use</td>
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</table>
Mounting Gateway and Cellular

Carefully unpack unit from its packaging. Properly inspect for defects before installing.

1. Before attaching gateway enclosure to pole, ensure the mount band clamps are correctly oriented. **NOTE:** Adjustable steel band allows mounting on pole diameters up to 15 inches.

2. Attach gateway enclosure to pole by tightening steel band clamps. Fold or trim excess metal band if needed.

3. Position cellular enclosure below the gateway enclosure and attach to pole by tightening both steel band clamps. **NOTE:** The distance (A) between the two enclosures should be adjusted to accommodate the length of the Ethernet cable and power in/out cable.

4. Install GPS and antenna into bracket and tighten bolt (45 lbs-in. torque).

5. Insert GPS and antenna wires through two glands in bottom of gateway enclosure.

6. Install two 0.75-inch diameter nonmetallic Type B liquid-tight conduit between gateway and cellular enclosures.
LightGrid™ Node
Outdoor Wireless Control System

Description
LightGrid™ Outdoor Wireless Control System from GE allows remote monitoring and control, utility-grade energy measurement and GPS mapping of streetlights.

Product Features
• Utility Grade Measurement up to 0.5% Accuracy
• Self-forming & self-restoring mesh network
• Static IPV6 data addressing and routing
• Reliable and Secure Encrypted Communications
• Nodes, gateway can be spaced up to 500m apart (Clear Line of Sight)
• Utility grade 15 minute time of use Energy consumption reporting
• Full Autonomous Photocell Functionality (No wireless network required)
• Time Based Lighting schedules to maximize energy savings
• Integrated GPS in each node for Real time Asset Reporting
• Dynamic Lumen Output Level Control
• Real time measurement and storage of Voltage, Current, Wattage, Power Factor, and Hours of operation

Applications
• Street Lighting
• Area Lighting
## Product Specifications

- **Input Voltage:** 120-277V, 347V and 480V
- **Radio Frequency:** 915 MHz ISM Band
- **Network Communication:** IEEE 802.15.4, 6LoWPAN, 50 Channel FHSS
- **Addressing:** IPv6
- **Dimming:** 0-10V
- **Operating Temperature:** -40 to +50C
- **Surge:** Meets ANSI C62.41 6KV, 3KA Combination Wave
- **Power consumption i.e. <2W 120-277V, < 3W 347 and 480V**
- **Photocell:** Complies with ANSI C136.10-2006
- **GPS:** Accuracy 3m (clear open sky)
- **Security:** AES Encryption and Certificate based authentication
- **Utility Grade Energy Measurement:** Complies with relevant sections of ANSI C12.20
- **Complies with FCC Part 15 required sub sections**
- **Complies with UL 773, Wet Rated, Type 2 Outdoor**
- **Complies with ANSI C136.41-2013 (ANSI Dimming)**
- **Warranty:** 5 yrs Standard, 10 yrs Extended Warranty Available

## Product Dimensions

![Product Dimensions Diagram](image)

## Ordering Number Logic

<table>
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<tr>
<th>Product ID</th>
<th>Voltage</th>
<th>Pin Configuration</th>
<th>PINS</th>
<th>Metering</th>
<th>GPS</th>
<th>Max Wattage</th>
<th>Network Configuration</th>
<th>Country/Pole</th>
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<tr>
<td>E L W N 0</td>
<td>120-277</td>
<td>5 = GE Dimming</td>
<td>5 Pin</td>
<td>2% Revenue Grade</td>
<td>GPS Capability</td>
<td>450 Watts</td>
<td>S = Stand Alone</td>
<td>None = Default (US)</td>
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<tr>
<td>E L W N 0</td>
<td>120-277</td>
<td>5 = GE Dimming</td>
<td>5 Pin</td>
<td>2% Revenue Grade</td>
<td>GPS Capability</td>
<td>450 Watts</td>
<td>B = Network B</td>
<td>None = Default</td>
</tr>
</tbody>
</table>

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www.gelighting.com

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CPY250-A-DM-D / F-B
CPY Series LED Canopy / Soffit Luminaire –
Direct Mount – Drop / Flat Lens – 122 Watts

Product Description
Slim, low profile, easy mounting from below the deck. Luminaire housing constructed of rugged cast aluminum with integral heat sink specifically designed for LED. Luminaire mounts directly to the canopy deck in a 2.0" (51mm) to 4.0" (102mm) round hole and is secured in place with self-sealing screws that provide water-tight seal. Suitable for use in single or double skin canopies with a minimum 4.0" (102mm) wide panels and a minimum 22 gauge, 0.030" (0.7mm) canopy thickness. Direct imaging of LEDs is eliminated with high efficiency patterned flat or 0.91" (23mm) drop glass lens.

Performance Summary
Made in the U.S.A. of U.S. and imported parts
CRI: Minimum 70 CRI
CCT: 5700K (+ / - 500K) Standard, 4000K (+ / - 300K)

Limited Warranty*: 10 years on luminaire / 10 years on Colorfast DeltaGuard® finish

Accessories

<table>
<thead>
<tr>
<th>Field Installed Accessories</th>
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<tbody>
<tr>
<td>XA-BXCCMW Upgrade Kit for use with Jet-Philips canopy luminaires</td>
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<tr>
<td>XA-BXCCNW Upgrade Kit for use with Elsco Franciscan canopy luminaires</td>
</tr>
<tr>
<td>XA-BXCCPW Upgrade Kit for use with LSI Dakota or Masters canopy luminaires</td>
</tr>
<tr>
<td>XA-BXCCQW Upgrade Kit for use with Whiteway Riviera or Rig-A-Lite canopy luminaires</td>
</tr>
<tr>
<td>XA-BXCCRW Upgrade Kit for use with Elsco Merrit canopy luminaires</td>
</tr>
<tr>
<td>XA-BXCCSW Upgrade Kit for use with LSI Richmond or Whiteway Civic canopy luminaires</td>
</tr>
</tbody>
</table>

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Ordering Information
Example: CPY250-A-DM-D-B-UL-WH-OPTIONS

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<th>CPY250</th>
<th>A</th>
<th>DM</th>
<th>D</th>
<th>B</th>
<th>Voltage</th>
<th>Color Options</th>
<th>Options</th>
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<tbody>
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<td>DM</td>
<td>Direct</td>
<td>0.91&quot; (23mm) Drop Lens</td>
<td>122W</td>
<td>UL Universal 120-277V</td>
<td>Wh</td>
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*See www.cree.com/lighting/products/warranty for warranty terms.
*For input power for 347–480V, refer to the Lumen Output, Electrical, and Lumen Maintenance data table below.
**Product Specifications**

**CONSTRUCTION & MATERIALS**
- Slim, low profile, easy mounting from below the deck
- Luminaire housing constructed of rugged cast aluminum with integral heat sink specifically designed for LED
- Luminaire mounts directly to the canopy deck in a 2.0" (51mm) to 4.0" (102mm) round hole and is secured in place with self-sealing screws that provide water-tight seal
- Suitable for single or double skin canopies with minimum 4.0" (102mm) wide panels and a minimum 22 gauge, 0.030" (0.7mm) canopy thickness
- Optional wet listed junction box rated for feed through (8 in, 4 out) #12 AWG conductors
- Fixture housing provided with 3/4" (19mm) conduit entry for direct wire feed
- Simple single hole drill for mounting to canopy
- Alignment pin included for ease of installation if desired (optional; requires drilling of additional hole)
- Below ceiling serviceable driver for ease of upgrade or replacement
- Exclusive Colorfast DeltaGuard® finish features an E-Coat epoxy primer with an ultra-durable powder topcoat, providing excellent resistance to corrosion, ultraviolet degradation and abrasion. Standard is white. Bronze, black, silver, and platinum bronze are also available

**ELECTRICAL SYSTEM**
- **Input Voltage:** 120–277V or 347–480V, 50 / 60Hz, Class 1 drivers
- **Power Factor:** > 0.9 at full load
- **Total Harmonic Distortion:** < 20% at full load
- **Integral 6kV surge suppression protection standard**
- **To address inrush current, slow blow fuse or type C / D breaker should be used**

**REGULATORY & VOLUNTARY QUALIFICATIONS**
- **cULus Listed**
- Suitable for wet locations
- Enclosure rated IP66 per IEC 60529 pending
- Consult factory for CE Certified products
- 6kV surge suppression protection tested in accordance with IEEE /ANSI C62.41.2
- Product qualified on the DesignLights Consortium™ (“DLC”) Products List (“QPL”)
- Luminaire and finish endurance tested to withstand 5,000 hours of elevated ambient salt fog conditions as defined in ASTM Standard B 117
- Meets Buy American requirements within ARRA
- Dark Sky Friendly, IDA Approved when ordered with “F” optic

**Photometry**

All published luminaire photometric testing performed to IESNA LM-79-08 standards by a NVLAP certified laboratory.

**Lumen Output, Electrical, and Lumen Maintenance Data**

<table>
<thead>
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<th>Optic</th>
<th>5700K</th>
<th>4000K</th>
<th>TOTAL CURRENT</th>
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<td>Integrated BUG Ratings**</td>
<td>System Watts 120–277V</td>
<td>System Watts 347–480V</td>
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<td>D</td>
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<tr>
<td>F</td>
<td>13,000</td>
<td>13,000</td>
<td>122</td>
<td>117</td>
</tr>
</tbody>
</table>

* Actual production yield may vary between -4 and +10% of initial delivered lumens.
** For more information on the IES BUG (Backlight-Uplight-Glare) Rating visit www.iesna.org/PDF/Errata/TM-15-1IBugRatingsAddendum.pdf.
*** For recommended lumen maintenance factor data see TD-16. Calculated Lm based on 6,000 hours LM-80-08 testing: > 100,000 hours.

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CR Series
CR14™ 1' x 4' Architectural LED Troffer

Product Description

The CR14™ Architectural LED troffer delivers up to 130 lumens per watt of exceptional 90 CRI light at 4000 lumens. This breakthrough performance is achieved by combining the high efficacy and high-quality light of Cree TrueWhite® Technology with a unique thermal management design. The CR14 product family is available in warm, neutral, cool, or daylight color temperatures and has step, 0-10V, or Lutron EcoSystem® Enabled dimming options. Its unique indirect illumination design makes the CR14 perfect for use in commercial new construction or renovated spaces.

Performance Summary

<table>
<thead>
<tr>
<th>CR14</th>
<th>Initial Delivered Lumens</th>
<th>CCT</th>
<th>Voltage</th>
<th>Control</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>22L</td>
<td>2,200, 3,100, 4,000, 5,000 lumens</td>
<td>30K</td>
<td>120-277 Volt</td>
<td>Blank</td>
<td>5 Step Dimming to 50%</td>
</tr>
<tr>
<td>35K</td>
<td>3500K</td>
<td>35K</td>
<td>34 Volt</td>
<td>34 Volt</td>
<td>0-10V Dimming to 5%</td>
</tr>
<tr>
<td>40K</td>
<td>4000K</td>
<td>40K</td>
<td>4000K</td>
<td>4000K</td>
<td>Lutron EcoSystem® Enabled to 5%*</td>
</tr>
<tr>
<td>50K</td>
<td>5000K</td>
<td>50K</td>
<td>5000K</td>
<td>5000K</td>
<td>Lutron EcoSystem® Enabled to 5%*</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Accessory</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjustable Cable</td>
<td>ACS-72 PDB J6, ACS 18/4 72 PDB JB</td>
</tr>
<tr>
<td>Chicago Plenum Field Kit</td>
<td>CPLCR, EJBCR SPK - Expanded size junction box for through wiring (5 pack)</td>
</tr>
<tr>
<td>Power Whip</td>
<td>PW 18/4 68 9T/SS CR 347 Volt CR 347V Step Dimming to 50%</td>
</tr>
<tr>
<td>Surface Mount Kit</td>
<td>SMK 14</td>
</tr>
</tbody>
</table>

NOTE: Use of Expanded Junction Box will expand the depth to 6.42”
and Emergency Backup will expand the depth to 6.05”. Use of 347V
will increase luminaire height by 1.4”.

Ordering Information

Example: CR14-40L-40K-S

<table>
<thead>
<tr>
<th>Product</th>
<th>Initial Delivered Lumens</th>
<th>CCT</th>
<th>Voltage</th>
<th>Control</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>CR14</td>
<td>22L</td>
<td>30K</td>
<td>Blank</td>
<td>5 Step Dimming to 50%</td>
<td>5 Step Dimming to 50%</td>
</tr>
<tr>
<td></td>
<td>35K</td>
<td>35K</td>
<td>34 Volt</td>
<td>34 Volt</td>
<td>0-10V Dimming to 5%</td>
</tr>
<tr>
<td></td>
<td>40K</td>
<td>40K</td>
<td>4000K</td>
<td>4000K</td>
<td>Lutron EcoSystem® Enabled to 5%*</td>
</tr>
<tr>
<td></td>
<td>50K</td>
<td>50K</td>
<td>5000K</td>
<td>5000K</td>
<td>Lutron EcoSystem® Enabled to 5%*</td>
</tr>
</tbody>
</table>

1. Not available with HD 2. Not available with HD, EB14, EB14SMK 3. Not available in the following options: 22L: 35K or 50K; 31L: All Colors; 40L: All Colors 4. Not available in 50L 5. Not available in LES types except 40L LES type

NOTE: Price adder may apply depending on configuration
CR14™ 1’ x 4’ Architectural LED Troffer

### Product Specifications

**CREE TRUEWHITE® TECHNOLOGY**
A revolutionary way to generate high-quality white light, CREE TrueWhite® Technology is a patented approach that delivers an exclusive combination of 90+ CRI, beautiful light characteristics, and lifelong color consistency, all while maintaining high luminous efficacy – a true no compromise solution.

**CREE LED TECHNOLOGY**
Cree’s total systems approach to product development is a comprehensive engineering philosophy that combines the most advanced LED sources, driver technologies, optics and forms. The result is highly-reliable luminaire solutions for both indoor and outdoor applications that reduce energy use, extend lifetimes, and maximize illumination performance and quality.

**ROOM-SIDE HEAT SINK**
An innovative thermal management system designed to maximize cooling effectiveness by integrating a unique room-side heat sink into the diffusing lens. This breakthrough design creates a pleasing architectural aesthetic effect while conducting heat away from LEDs in a temperature-controlled environment. This enables the LEDs to consistently run cooler, providing significant boosts to lifetime, efficacy, and color consistency.

**CONSTRUCTION & MATERIALS**
- Durable 22-gauge steel housing with standard troffer access plate for electrical installation
- One-piece lower reflector finished with a textured high reflectance white polyester powder coating creates a comfortable visual transition from the lens to the ceiling plane
- Includes t-bar clips and holes for mounting support wires enable recessed or suspended installation
- Individual luminaires may be mounted end to end for a continuous row of illumination

**OPTICAL SYSTEM**
- Unique combination of reflective and refractive optical components achieves a uniform, comfortable appearance while eliminating pixelation and color fringing
- Components work together to optimize distribution, balancing the delivery of high illuminance levels on horizontal surfaces with an ideal amount of light on walls and vertical surfaces. This increases the perception of spaciousness
- Diffusing lens integrated with upward-facing LED strip eliminates direct perception of individual LEDs

**ELECTRICAL SYSTEM**
- Integral, high-efficiency driver
- Power Factor: 0.9 nominal
- Input Power: Stays constant over life
- Input Voltage: 120-277V or 347V, 50/60Hz
- Operating Temperature Range: 0°C - + 35°C (32°F - + 95°F)
- Total Harmonic Distortion: <20%

**CONTROLS**
- Step dimming to 50%*
- Continuous dimming to 5% with 0-10V DC control protocol*
- Lutron EcoSystem® Enabled option allows seamless integration with Lutron EcoSystem controls
- Reference www.cree.com/exLink.asp?70982140Z58R34126620963 for recommended dimming controls and wiring diagrams

**REGULATORY & VOLUNTARY QUALIFICATIONS**
- cULs Listed
- Suitable for damp locations
- Designed for indoor use
- UL924 (EB14 option)
- DLC qualified. Please refer to www.designlights.org/QPL for most current information
- RoHS compliant. Consult factory for additional details
- Meets FCC Part 15 standards for conducted and radiated emissions

### Recommended CR Series Lumen Maintenance Factors (LMF)

<table>
<thead>
<tr>
<th>Ambient Temperature (°C)</th>
<th>Initial Delivered Lumen</th>
<th>Initial LMF</th>
<th>25K hr Projected LMF</th>
<th>50K hr Projected LMF</th>
<th>75K hr Calculated LMF</th>
<th>100K hr Calculated LMF</th>
</tr>
</thead>
<tbody>
<tr>
<td>0°C (41°F)</td>
<td>22L, 31L, 40L, and 50L</td>
<td>1.05</td>
<td>1.04</td>
<td>1.04</td>
<td>1.04</td>
<td>1.04</td>
</tr>
<tr>
<td></td>
<td>40LHE</td>
<td>1.05</td>
<td>1.01</td>
<td>0.98</td>
<td>0.96</td>
<td>0.94</td>
</tr>
<tr>
<td>5°C (41°F)</td>
<td>22L, 31L, 40L, and 50L</td>
<td>1.04</td>
<td>1.03</td>
<td>1.03</td>
<td>1.03</td>
<td>1.03</td>
</tr>
<tr>
<td></td>
<td>40LHE</td>
<td>1.04</td>
<td>1.00</td>
<td>0.97</td>
<td>0.95</td>
<td>0.93</td>
</tr>
<tr>
<td>10°C (50°F)</td>
<td>22L, 31L, 40L, and 50L</td>
<td>1.03</td>
<td>1.02</td>
<td>1.02</td>
<td>1.02</td>
<td>1.02</td>
</tr>
<tr>
<td></td>
<td>40LHE</td>
<td>1.03</td>
<td>0.99</td>
<td>0.96</td>
<td>0.94</td>
<td>0.92</td>
</tr>
<tr>
<td>15°C (59°F)</td>
<td>22L, 31L, 40L, and 50L</td>
<td>1.02</td>
<td>1.01</td>
<td>1.01</td>
<td>1.01</td>
<td>1.01</td>
</tr>
<tr>
<td></td>
<td>40LHE</td>
<td>1.02</td>
<td>0.98</td>
<td>0.95</td>
<td>0.93</td>
<td>0.91</td>
</tr>
<tr>
<td>20°C (68°F)</td>
<td>22L, 31L, 40L, and 50L</td>
<td>1.01</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>40LHE</td>
<td>1.01</td>
<td>0.97</td>
<td>0.95</td>
<td>0.92</td>
<td>0.90</td>
</tr>
<tr>
<td>25°C (77°F)</td>
<td>22L, 31L, 40L, and 50L</td>
<td>1.00</td>
<td>0.99</td>
<td>0.99</td>
<td>0.99</td>
<td>0.99</td>
</tr>
<tr>
<td></td>
<td>40LHE</td>
<td>1.00</td>
<td>0.96</td>
<td>0.94</td>
<td>0.91</td>
<td>0.89</td>
</tr>
<tr>
<td>30°C (86°F)</td>
<td>22L, 31L, 40L, and 50L</td>
<td>0.99</td>
<td>0.98</td>
<td>0.98</td>
<td>0.98</td>
<td>0.98</td>
</tr>
<tr>
<td></td>
<td>40LHE</td>
<td>0.99</td>
<td>0.95</td>
<td>0.93</td>
<td>0.91</td>
<td>0.89</td>
</tr>
<tr>
<td>35°C (95°F)</td>
<td>22L, 31L, 40L, and 50L</td>
<td>0.98</td>
<td>0.97</td>
<td>0.97</td>
<td>0.97</td>
<td>0.97</td>
</tr>
<tr>
<td></td>
<td>40LHE</td>
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<td>0.94</td>
<td>0.92</td>
<td>0.90</td>
<td>0.88</td>
</tr>
<tr>
<td>40°C (104°F)</td>
<td>22L, 31L, 40L, and 50L</td>
<td>0.97</td>
<td>0.96</td>
<td>0.96</td>
<td>0.96</td>
<td>0.96</td>
</tr>
<tr>
<td></td>
<td>40LHE</td>
<td>0.97</td>
<td>0.93</td>
<td>0.91</td>
<td>0.89</td>
<td>0.87</td>
</tr>
</tbody>
</table>

1. Lumen maintenance values at 25°C (77°F) are calculated per TM-21 based on LM-80 data and in-situ luminaire testing
2. In accordance with IESNA TM-21-11. Calculated Values represent interpolated value based on time durations that are within six times (6X) the IESNA LM-80-08 total test duration (in hours) for the device under testing (DUT) i.e. the packaged LED chip
3. In accordance with IESNA TM-21-11. Projected Values represent time durations that exceed six times (6X) the IESNA LM-80-08 total test duration (in hours) for the device under testing (DUT) i.e. the packaged LED chip
Photometry
CR14-40L-30K BASED ON LTL REPORT TEST #: 24294
Luminaire photometry has been conducted by a NVLAP accredited testing laboratory in accordance with IESNA LM-79-08. IESNA LM-79-08 specifies the entire luminaire as the source resulting in a luminaire efficiency of 100%.

<table>
<thead>
<tr>
<th>Vertical Angle</th>
<th>Horizontal Angle</th>
</tr>
</thead>
<tbody>
<tr>
<td>0°</td>
<td>0°</td>
</tr>
<tr>
<td>45°</td>
<td>45°</td>
</tr>
<tr>
<td>75°</td>
<td>75°</td>
</tr>
<tr>
<td>85°</td>
<td>85°</td>
</tr>
</tbody>
</table>

Average Luminance Table (cd/m²)

<table>
<thead>
<tr>
<th>Vertical Angle</th>
<th>0°</th>
<th>45°</th>
<th>75°</th>
<th>85°</th>
</tr>
</thead>
<tbody>
<tr>
<td>0°</td>
<td>5,407</td>
<td>5,407</td>
<td>5,407</td>
<td></td>
</tr>
<tr>
<td>45°</td>
<td>5,015</td>
<td>5,002</td>
<td>4,673</td>
<td></td>
</tr>
<tr>
<td>75°</td>
<td>3,029</td>
<td>1,690</td>
<td>1,282</td>
<td></td>
</tr>
<tr>
<td>85°</td>
<td>1,727</td>
<td>1,249</td>
<td>1,321</td>
<td></td>
</tr>
</tbody>
</table>

Zonal Lumen Summary

<table>
<thead>
<tr>
<th>Zone</th>
<th>Lumens %</th>
<th>Lamp</th>
<th>Luminaire</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-30</td>
<td>1,220</td>
<td>N/A</td>
<td>30.8%</td>
</tr>
<tr>
<td>0-40</td>
<td>1,995</td>
<td>N/A</td>
<td>50.4%</td>
</tr>
<tr>
<td>0-60</td>
<td>3,385</td>
<td>N/A</td>
<td>85.5%</td>
</tr>
<tr>
<td>0-90</td>
<td>3,959</td>
<td>N/A</td>
<td>100%</td>
</tr>
<tr>
<td>0-180</td>
<td>3,959</td>
<td>N/A</td>
<td>100%</td>
</tr>
</tbody>
</table>

Application Reference
Based on CR14-40L-30K Luminaire

<table>
<thead>
<tr>
<th>Spacing</th>
<th>Initial Delivered Lumens</th>
<th>Lumens</th>
<th>Wattage</th>
<th>LFW</th>
<th>w/R²</th>
<th>Average fc</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 x 8</td>
<td>22L 2200 22 100 0.35 30</td>
<td>40L 4000 40 100 0.69 54</td>
<td>40LHE 4000 30.5 125 0.56 54</td>
<td>50L 5000 50 100 0.78 68</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 x 10</td>
<td>22L 2200 22 100 0.28 25</td>
<td>40L 4000 40 100 0.55 45</td>
<td>40LHE 4000 30.5 125 0.45 45</td>
<td>50L 5000 50 100 0.62 57</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 x 10</td>
<td>22L 2200 22 100 0.22 21</td>
<td>40L 4000 40 100 0.44 38</td>
<td>40LHE 4000 30.5 125 0.36 38</td>
<td>50L 5000 50 100 0.50 48</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 x 12</td>
<td>22L 2200 22 100 0.19 17</td>
<td>40L 4000 40 100 0.37 30</td>
<td>40LHE 4000 30.5 125 0.30 30</td>
<td>50L 5000 50 100 0.42 38</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* ceiling: 80/50/20 reflectances; 2.5 workplane, open room. LLF: 1.0 Initial Open Space: 50' x 40' x 10'
CR Series
CR22™ 2' x 2' Architectural LED Troffer

Product Description
The CR22™ Architectural LED troffer delivers up to 100 lumens per watt of exceptional 90 CRI light at both 2000 and 3200 lumen levels. This breakthrough performance is achieved by combining the high efficacy and high-quality light of Cree TrueWhite® Technology with a unique thermal management design. The CR22™ product family is available in warm, neutral, cool, or daylight color temperatures and has step, 0-10V, or Lutron EcoSystem® Enabled dimming options. Its unique indirect illumination design lightweight design makes the CR22™ perfect for use in commercial new construction or renovated spaces.

Performance Summary
Utilizes Cree TrueWhite® Technology (90 CRI)
Efficacy: 90-100 LPW
Initial Delivered Lumens: 2,000, 3,200 lumens
Input Power: 22-35 watts
CRI: 90 CRI (Cree TrueWhite® Technology), 80+ CRI (HD)
CCT: 3000K, 3500K, 4000K, 5000K
Input Voltage: 120-277 VAC or 347 VAC
Limited Warranty*: 10 years
Lifetime: Designed to last from 50,000 hours (HD), 75,000 hours (Standard TW), and 100,000 hours (HE TW)
Controls: Step Level to 50%, 0-10V Dimming or Lutron EcoSystem® Enabled to 5%*
Mounting: Recessed**

*See www.cree.com/lighting/products/warranty for warranty terms
**Reference www.cree.com/lighting for recommended dimming control options

Accessories
Field-Installed
Adjustable Cable
ACS 72 P08 JB
ACS 180/4-72 P08 JB
Chicago Plenum Field Kit
CPDLR
Chicago Plenum Field Kit-Emergency
CPDLR EM
Junction Box
EJBCR 5PK
- Expanded size junction box for through wiring (5 pack)
Power Whip
PW 18/4 06 9T/SS CR
347 Volt
CR 347V
Step Dimming to 50%
CR 347V S0
Surface Mount Kit
SMK CR22

Ordering Information
Example: CR22-20L-35K-S

<table>
<thead>
<tr>
<th>CR22</th>
<th>Initial Delivered Lumens</th>
<th>CCT</th>
<th>Voltage</th>
<th>Control</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>CR22</td>
<td>20L1</td>
<td>30K 3000K 35K 3500K 40K 4000K 50K 5000K</td>
<td>Blank 120-277 Volt 34 347 Volt Integrated option available on 32L only. Other types require addition of a 347 accessory kit (see table above) S Step Dimming to 50% 0-10V Dimming to 5% LES® Lutron EcoSystem® Enabled to 5% HD CRI 80+ (44W 4000 lumens - 90 LPW) - Available only with 40L EB14® Emergency Backup - 1400 lumens - Not for use with SMK Kits - Use EB14 SMK EB14SM® Emergency Backup with surface mount kit - 1400 lumens - Includes surface mount kit accessory (SMK-CR22)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Not available with HD 2. Not available in 20L 3. Not available in LES types

NOTE: Price adder may apply depending on configuration

Rev. Date: V5 10/28/2015
Product Specifications

CREE TRUEWHITE® TECHNOLOGY
A revolutionary way to generate high-quality white light, Cree TrueWhite® Technology is a patented approach that delivers an exclusive combination of 90+ CRI, beautiful light characteristics, and lifelong color consistency, all while maintaining high luminous efficacy – a true no compromise solution.

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ROOM-SIDE HEAT SINK
An innovative thermal management system designed to maximize cooling effectiveness by integrating a unique room-side heat sink into the diffusing lens. This breakthrough design creates a pleasing architectural aesthetic while conducting heat away from LEDs in a temperature-controlled environment. This enables the LEDs to consistently run cooler, providing significant boosts to lifetime, efficacy, and color consistency.

CONSTRUCTION & MATERIALS
- Durable 22-gauge steel housing with standard troffer access plate for electrical installation
- One-piece lower reflector finished with a textured high reflectance white powder coating creates a comfortable visual transition from the lens to the ceiling plane
- Includes T-bar clips and holes for mounting support wires enable recessed or suspended installation
- Individual luminaires may be mounted end to end for a continuous row of illumination

OPTICAL SYSTEM
- Unique combination of reflective and refractive optical components achieves a uniform, comfortable appearance while eliminating pixelation and color fringing
- Components work together to optimize distribution, balancing the delivery of high illuminance levels on horizontal surfaces with an ideal amount of light on walls and vertical surfaces. This increases the perception of spaciousness
- Diffusing lens integrated with upward-facing LED strip eliminates direct view of LEDs or balances brightness of lens with the ceiling to create a low glare high angle appearance

ELECTRICAL SYSTEM
- Integral, high-efficiency driver
- Power Factor: >= 0.9 nominal
- Input Power: Stays constant over life.
- Input Voltage: 120-277V or 347V, 50/60Hz
- Operating Temperature Range: 0˚C - + 35˚C (32˚F - + 95˚F)
- Total Harmonic Distortion: < 20%

CONTROLS
- Step dimming to 50%*
- Optional continuous dimming to 5% with 0-10V DC control protocol*
- Optional Lutron EcoSystem® Enabled option allows seamless integration with Lutron EcoSystem controls*

REGULATORY & VOLUNTARY QUALIFICATIONS
- cULus Listed
- Suitable for damp locations
- Designed for indoor use
- UL924 (EB14 option)
- DLC qualified. Please refer to www.designlights.org/QPL for most current information
- RoHS compliant. Consult factory for additional details
- Meets FCC Part 15 standards for conducted and radiated emissions

* Reference www.cree.com/lighting for recommended dimming controls and wiring diagrams

---

Recommended CR Series Lumen Maintenance Factors (LMF)

<table>
<thead>
<tr>
<th>Ambient</th>
<th>Initial Delivered Lumen</th>
<th>Initial LMF</th>
<th>25K hr Projecteda LMF</th>
<th>50K hr Projectedb LMF</th>
<th>75K hr Calculatedb LMF</th>
<th>100K hr Calculatedb LMF</th>
</tr>
</thead>
<tbody>
<tr>
<td>0˚C (41˚F)</td>
<td>20L and 32L</td>
<td>1.05</td>
<td>1.04</td>
<td>1.04</td>
<td>1.04</td>
<td>1.04</td>
</tr>
<tr>
<td>5˚C (41˚F)</td>
<td>20L and 32L</td>
<td>1.04</td>
<td>1.03</td>
<td>1.03</td>
<td>1.03</td>
<td>1.03</td>
</tr>
<tr>
<td>10˚C (50˚F)</td>
<td>20L and 32L</td>
<td>1.03</td>
<td>1.02</td>
<td>1.02</td>
<td>1.02</td>
<td>1.02</td>
</tr>
<tr>
<td>15˚C (59˚F)</td>
<td>20L and 32L</td>
<td>1.02</td>
<td>1.01</td>
<td>1.01</td>
<td>1.01</td>
<td>1.01</td>
</tr>
<tr>
<td>20˚C (68˚F)</td>
<td>20L and 32L</td>
<td>1.01</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>25˚C (77˚F)</td>
<td>20L and 32L</td>
<td>1.00</td>
<td>0.99</td>
<td>0.99</td>
<td>0.99</td>
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</tr>
<tr>
<td>30˚C (86˚F)</td>
<td>20L and 32L</td>
<td>0.99</td>
<td>0.98</td>
<td>0.98</td>
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</tr>
<tr>
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<td>20L and 32L</td>
<td>0.98</td>
<td>0.97</td>
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</tr>
<tr>
<td>40˚C (104˚F)</td>
<td>20L and 32L</td>
<td>0.97</td>
<td>0.96</td>
<td>0.96</td>
<td>0.96</td>
<td>0.96</td>
</tr>
</tbody>
</table>

1 Lumen maintenance values at 25˚C (77˚F) are calculated per TM-21 based on LM-80 data and in-situ luminaire testing.
2 In accordance with IESNA TM-21-11, Projected Values represent interpolated value based on time durations that are within six times (6X) the IESNA LM-80-08 total test duration (in hours) for the device under testing (DUT) i.e. the packaged LED chip
3 In accordance with IESNA TM-21-11, Calculated Values represent interpolated value based on time durations that exceed six times (6X) the IESNA LM-80-08 total test duration (in hours) for the device under testing (DUT) i.e. the packaged LED chip

---

CR22™ 2’ x 2’ Architectural LED Troffer

[CR22™ 2’ x 2’ Architectural LED Troffer Details]
CR22™ 2’ x 2’ Architectural LED Troffer

Photometry
CR22-32L-30K BASED ON LTL REPORT TEST #: 24292
Luminaire photometry has been conducted by a NVLAP accredited testing laboratory in accordance with IESNA LM-79-08. IESNA LM-79-08 specifies the entire luminaire as the source resulting in a luminaire efficiency of 100%.

Effective Floor Cavity Reflectance: 20%
Reference www.cree.com/Lighting/Products/Indoor/Troffers/CR-Series for detailed photometric data

Application Reference
Based on CR22-32L-30K Luminaire

Open Space

<table>
<thead>
<tr>
<th>Spacing</th>
<th>Lumens</th>
<th>Wattage</th>
<th>LPW</th>
<th>w/ft²</th>
<th>Average fc</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 x 8</td>
<td>2000L</td>
<td>22W</td>
<td>90</td>
<td>0.35</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>3200L</td>
<td>32W</td>
<td>100</td>
<td>0.55</td>
<td>44</td>
</tr>
<tr>
<td>8 x 10</td>
<td>2000L</td>
<td>22W</td>
<td>90</td>
<td>0.28</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>3200L</td>
<td>32W</td>
<td>100</td>
<td>0.44</td>
<td>37</td>
</tr>
<tr>
<td>10 x 10</td>
<td>2000L</td>
<td>22W</td>
<td>100</td>
<td>0.22</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>3200L</td>
<td>32W</td>
<td>100</td>
<td>0.35</td>
<td>31</td>
</tr>
<tr>
<td>10 x 12</td>
<td>2000L</td>
<td>22W</td>
<td>90</td>
<td>0.19</td>
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<td></td>
<td>3200L</td>
<td>32W</td>
<td>100</td>
<td>0.29</td>
<td>25</td>
</tr>
</tbody>
</table>

9' ceiling: 80/50/20 reflectances; 2.5' workplane open room. LLF: 1.0 Initial Open Space: 50' x 40' x 10'

Reference www.cree.com/Lighting/Products/Indoor/Troffers/CR-Series for detailed photometric data

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<td>90</td>
<td>0.35</td>
<td>28</td>
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<td>2000L</td>
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9' ceiling: 80/50/20 reflectances; 2.5' workplane open room. LLF: 1.0 Initial Open Space: 50' x 40' x 10'
Minimum Scale. Maximum Results.

Pedestrian in scale only, the D-Series LED Area, Size 0 is an extraordinary luminaire that can be configured to meet any site’s lighting needs. The versatility and power of this luminaire prove big things really do come in small packages.

Key Features:

- Energy savings of 70% vs. comparable metal halide luminaires; saves $141 per luminaire, per year over 400W metal halide
- 20+ years expected service life (with lumen maintenance up to L99/100,000 hours, 25°C)
- Proprietary precision optics deliver exceptional uniformity and allow for increased spacing, resulting in fewer poles and lower overall cost
- Control options from Acuity Controls include standalone photocell, switched bi-level, part-night scheduled dimming, multi-level motion sensor, and ROAM® wireless monitoring and control

Quick Facts:

- Up to 400W MH replacement
- Lumen packages from 3,000 - 19,000 lumens up to L92/50,000 hours
- Efficacies up to 139 lumens per watt
- 14 factory-rotatable distributions available
- Available in 3000K, 4000K & 5000K CCT and Amber LED
- Weight: 16 lbs; EPA: 0.95 ft²

### Model Input Watts Lumens Metal Halide Replacement

<table>
<thead>
<tr>
<th>Model</th>
<th>Input Watts</th>
<th>Lumens</th>
<th>Metal Halide Replacement</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSX0 LED P1 40K T3M</td>
<td>38W</td>
<td>4,577</td>
<td>175W</td>
</tr>
<tr>
<td>DSX0 LED P3 40K T3M</td>
<td>71W</td>
<td>8,205</td>
<td>250W</td>
</tr>
<tr>
<td>DSX0 LED P5 40K T3M</td>
<td>89W</td>
<td>11,346</td>
<td>400W</td>
</tr>
<tr>
<td>DSX0 LED P7 40K T3M</td>
<td>166W</td>
<td>17,832</td>
<td>620W</td>
</tr>
</tbody>
</table>
D-Series LED Area Luminaire, Size 0

**Example:** DSX0 LED P6 40K T3M MVOLT SPA DDBXD

### Ordering Information

<table>
<thead>
<tr>
<th>Series</th>
<th>LEDs</th>
<th>Color temperature</th>
<th>Distribution</th>
<th>Voltage</th>
<th>Mounting</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSX0 LED</td>
<td>Forward optics</td>
<td>30K 3000K</td>
<td>T1S Type I short</td>
<td>MVOLT 120</td>
<td></td>
</tr>
<tr>
<td></td>
<td>40K 4000K</td>
<td>T2S Type II short</td>
<td>TSS Type V short</td>
<td>208</td>
<td></td>
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<tr>
<td></td>
<td>50K 5000K</td>
<td>T2M Type II medium</td>
<td>TSM Type V medium</td>
<td>240</td>
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<tr>
<td></td>
<td>AMBPC Amber phosphor</td>
<td>T3S Type III short</td>
<td>TSW Type V wide</td>
<td>277</td>
<td></td>
</tr>
<tr>
<td></td>
<td>converted</td>
<td>T3M Type III medium</td>
<td>LCCO Left corner cutoff</td>
<td>347</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>T4M Type IV medium</td>
<td>RCCO Right corner cutoff</td>
<td>480</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>TFFM Forward throw medium</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>T5S Type V very short</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>T5V Square pole mounting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rotated optics</td>
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<td></td>
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</tr>
<tr>
<td></td>
<td>P10 P12</td>
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</tr>
<tr>
<td></td>
<td>P11 P13</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

**Accessories** Ordered and shipped separately.

<table>
<thead>
<tr>
<th>Controls &amp; Shields</th>
<th>Other options</th>
<th>Finish (required)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DLL127F 1.5 IU</td>
<td>BL30 Bi-level switched dimming, 30%</td>
<td>DDBXD Dark bronze</td>
</tr>
<tr>
<td>DLL347F 1.5 IU</td>
<td>BL50 Bi-level switched dimming, 50%</td>
<td>DLBLXD Textured black</td>
</tr>
<tr>
<td>DLL480F 1.5 IU</td>
<td>PNMT0D3 Part night, dim to dawn</td>
<td>DNAXD Natural aluminum</td>
</tr>
<tr>
<td>DSHHORT 5BK U</td>
<td>PNMTS03 Part night, dim 5 hrs</td>
<td>DWHXD White</td>
</tr>
<tr>
<td>DSX0HS 20C U</td>
<td>PNMTG03 Part night, dim 6 hrs</td>
<td>DDBT XD Textured dark bronze</td>
</tr>
<tr>
<td>DSX0HS 30C U</td>
<td>PNMTT03 Part night, dim 7 hrs</td>
<td>DBLBXD Textured stitched</td>
</tr>
<tr>
<td>DSX0HS 40C U</td>
<td>FA0 Field adjustable output</td>
<td>DNATXD Textured natural aluminum</td>
</tr>
<tr>
<td>DSX0DDL U</td>
<td>BS Bird spikes</td>
<td>DWHGD Textured white</td>
</tr>
<tr>
<td>PUMBA DDBXD U</td>
<td></td>
<td></td>
</tr>
<tr>
<td>KMA8 DDBXD U</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Please use the spec sheet at www.acuitybrands.com when ordering to ensure component compatibility for your desired configuration.

**DSX2**

400W - 1000W MH Replacement

**DSX1**

250W - 750W MH Replacement

**DSX0**

175W - 400W MH Replacement

DesignLights Consortium® (DLC) qualified product. Not all versions of this product may be DLC qualified. Please check the DLC Qualified Products List at www.designlights.org to confirm which versions are qualified.

Visit www.lithonia.com for more information
HMLED2 06 4K AH G F P7 RFD211068

Weight = 52lbs
EPA = 1.30 sq. ft.
UL1598, 40C, Wet location

Cast Aluminum Housing

Hinged Access To Electrical Housing

23"

27"

10"

HMLED2

Series

06 = 06 Modules
09 = 09 Modules
12 = 12 Modules

Number of LED Modules

6

4K

Color Temperature

4K = 4,000K CCT +/- 250K
5K = 5,000K CCT +/- 250K

Voltage

AH = Auto-Sensing Voltage (120 - 277 V)

Voltage

AH = Auto-Sensing Voltage (347 - 480 V)

Options

AO = Field Adjustable Output
DM = 0-10v Dimming
FD1 = Single Fusible Disconnect
FD2 = Double Fusible Disconnect

Accessories

F1 = Single Fusing Accessory
F2 = Double Fusing Accessory

HMLED2D90 = 90 Degree Shield

HMLED2D120 = 120 Degree Shield

HMLED2D180 = 180 Degree Shield

Housing Color

A = As Specified
G = Gray
H = Graphite
K = Black
Z = Bronze
W = White

M = Medium, Asymmetric
N = Narrow, Asymmetric
F = Forward Throw, Asymmetric
AN = Area Narrow
AW = Area Wide

PCL1 = DTL DLL Photocontrol for 120-277V
PCL3 = DTL Twist-off Photocontrol for 347V
PCL4 = DTL Twist-off Photocontrol for 480V
PSC = Shorting Cap

PRODUCT ENGINEERED TO LIMIT INRUSH TO 100A PER CUSTOMERS SPEC

ORDER #: 8/14/14
DRAWN #: LUM_HMLED2
1 of 3

DRAFT
Specifications

General Construction

Rugged die cast, low copper content aluminum 380 alloy electrical and optical housing are polyester powder coated with super durable paint for durability and corrosion resistance. Rigorous pre-treating and painting process yields a finish that achieves a scribe creepage rating of 8 (per ASTM D1654) after over 5,000 hours exposure to salt fog chamber (per ASTM B117). Four bolt horizontal arm mount with +/-5 degree vertical adjustment provides 3G vibration rating per ANSI C136. Mast arm mount is adjustable for arms from 1-1/4" to 2" (1-5/8" to 2-3/8"). Two captive bolts disengage top electrical cover for easy access to LED drivers, surge protection, and terminal block. IP66 rated LED modules, IP65 electrical assembly per IEC60068-2-3. Luminaire is UL 1598 safety listed to 40C, wet locations. Luminaire electrical and optical housing ship complete in one carton facilitating installation and minimizing carton disposal at jobsite.

Electrical

Quick disconnect connectors for ease of installation and maintenance. Surge protection meets 10KV/5KA per ANSI/IEEE962.41. Driver meets maximum total harmonic distortion (THD) of 20% and is ROHS compliant. A three stage terminal block is standard for ease of installation.

Optical

Multi die LED chip on board (COB) technology, Color temperature options of 4000K and 5000K with CRI of 70 minimum. Borosilicate prismatic glass optics ensure longevity and minimize dirt depreciation. Zero uplight optics reduce sky glow and meets Dark Sky requirements. Prismatic glass optics provide overlapping pattern on application space eliminating dark spots. Prismatic glass optics minimize direct view of LED, reducing glare. Rotatable optic assembly provides alignment of asymmetric distributions to roadway.

Controls

Controls options include the P3, P5, and P7 locking style photocell receptacles. The P5 and P7 receptacle options are factory pre-wired to dimming leads of drivers.

PCSS - Premium solid state locking style photocell (10 year rated life)

PCL1 - Extreme long life solid state locking-style photocell (20 year rated life)

Field Adjustable Output (AO) module - An onboard device that adjusts the light output and input wattage to meet site specific requirements, allowing a single fixture configuration to be flexibly applied in many different applications. The AO module is pre-set at the factory to position number 8.

Operating Characteristics (AN Optics)

<table>
<thead>
<tr>
<th>LED Qty</th>
<th>CCT</th>
<th>Lumens</th>
<th>Input Watts</th>
<th>LPW</th>
<th>Input Amps</th>
<th>L83 @ 25C</th>
<th>Driver Life @ 25C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4000K</td>
<td></td>
<td>31,419</td>
<td>252</td>
<td>125</td>
<td>2.10</td>
<td>100,000 hrs</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.20</td>
<td>&gt;100,000 hrs</td>
</tr>
<tr>
<td>9</td>
<td></td>
<td></td>
<td>46,675</td>
<td>376</td>
<td>124</td>
<td>3.10</td>
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<tr>
<td>12</td>
<td></td>
<td>60,990</td>
<td>500</td>
<td>122</td>
<td></td>
<td>4.10</td>
<td></td>
</tr>
</tbody>
</table>

Testing Compliance

See Holophane HMAO-LED Validation Test Specification - Luminaire conforms to following standards:


Manufacturing

Manufactured in Crawfordsville, Indiana. ARRA compliant. Test 100% electrical of all luminaires before shipment. No less than five (5) years experience in manufacturing LED-based products.

Warranty

Five Year Limited warranty. Full warranty terms located at www.acuitybrands.com/CustomerResources/Terms_and_conditions.aspx

Note

Actual performance may differ as a result of end-user environment and application. Actual wattage may differ by +/- 8% when operating between 120-480V +/-10%. Specifications subject to change without notice.
HMLED2 12 4K AH G F P7 RFD211069

- Cast Aluminum Housing
- Hinged Access To Electrical Housing

Dimensions:
- 23" x 27" x 10"

Specifications:
- Series: HMLED2
- Number of LED Modules: 12
- Color Temperature: 4K = 4,000K CCT +/-250K
- Voltage: AS = Auto-Sensing Voltage (120 - 277 V)
- AH = Auto-Sensing Voltage (347 - 480 V)

Options:
- A = As Specified
- M = Medium, Asymmetric
- G = Gray
- N = Narrow, Asymmetric
- H = Graphite
- F = Forward Throw, Asymmetric
- K = Black
- W = Bronze
- AN = Area Narrow
- Optical
- AW = Area Wide

Accessories:
- P7 RFD211068
- AO = Field Adjustable Output
- DM = 0-10v Dimming
- FD1 = Single Fusible Disconnect
- FD2 = Double Fusible Disconnect
- P3 = 3 Pin NEMA Receptacle
- P5 = 5 Pin NEMA Receptacle
- P7 = 7 Pin NEMA Receptacle
- PCSS = DTL Solid-State Lighting
- Photocntlr 120-277V
- PCL1 = DTL DLL Photocntlr for 120-277V
- PCL3 = DTL Twist-off Photocntlr for 347V
- PCL4 = DTL Twist-off Photocntlr for 480V
- F1 = Single Fusing Accessory
- F2 = Double Fusing Accessory
- HMLED2D90 = 90 Degree Shield
- HMLED2D120 = 120 Degree Shield
- HMLED2D180 = 180 Degree Shield
- PSC = Shorting Cap

Ordering Information:
- Type: DLT_HMLED2
- Drawn: 6/14
- Date: 8/14
- DWG #: LUM_HMLED2

Product engineered to limit inrush to 100A per customers spec.
Specifications

General Construction

Rugged die cast, low copper content aluminum 380 alloy electrical and optical housing are polyester powder coated with super durable paint for durability and corrosion resistance. Rigorous pre-treating and painting process yields a finish that achieves a scribe creepage rating of 8 (per ASTM D1654) after over 5,000 hours exposure to salt fog chamber (per ASTM B117). Four bolt horizontal arm mount with +/-5 degree vertical adjustment provides 3G vibration rating per ANSI C136. Mast arm mount is adjustable for arms from 1-1/4" to 2" (1-5/8" to 2-3/8"). Two captive bolts disengage top electrical cover for easy access to LED drivers, surge protection, and terminal block. IP66 rated LED modules, IP65 electrical assembly per IEC60688-2-3. Luminaire is UL 1598 safety listed to 40C, wet locations. Luminaire electrical and optical housing ship complete in one carton facilitating installation and minimizing carton disposal at jobsite.

Electrical

Quick disconnect connectors for ease of installation and maintenance. Surge protection meets 10KV/5KA per ANSI/IEECE62.41. Driver meets maximum total harmonic distortion (THD) of 20% and is ROHS compliant. A three stage terminal block is standard for ease of installation.

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Note

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LLW
LED Low Profile Wrap

SPECIFICATIONS

Features
- This handy wrap is an excellent choice for hallways, closets, utility rooms, back-of-house locations and low ceiling areas.
- Diffuser features flat bottom, vertical sides and interior overlay providing uniformity without pixilation.
- Surface mount or stem suspended.
- Choice of two lumen packages and dimming option available.
- Long-life, LEDs at L70 (70% lumen maintenance) at 50,000 hours to reduce life cycle maintenance costs.
- Optional emergency battery backup for safety lighting.
- Available in 2' and 4' lengths.
- Up to 100 lumens per watt.
- Color Rendering Index (CRI) > 80.

Construction
- Heavy gauge steel housing, die embossed for maximum rigidity
- Prismatic acrylic diffuser with overlay hinges from either side
- Certain airborne contaminants can diminish integrity of acrylic.
  Contact factory for chemical compatibility.
- LED boards and driver accessible for future maintenance or upgrades
- Weight: 1x2 - 5 lbs. 1x4 - 10 lbs.

Electrical
- Input Voltage Range: 120-277 VAC Nom.
- Frequency: 50/60 Hz Nom.
- Active Power Factor Correction
- Power Factor: >0.90 @ full load, 120V through 277V
- Harmonic Distortion: THD < 20% @ full load
- Protection: Over-Voltage, Over-Temperature (110º) & Short Circuit
- Compliant to FCC Part 15 requirements for EMI/RFI emissions
- NEC/CEC compliant ballast disconnect is standard.
- Optional emergency battery pack

FOOTNOTES
1 Bi-Level driver must be controlled by sensor or A/B switching.
2 Must be used in conjunction with lighting controls.
3 Only available in 4 ft.

ORDERING INFORMATION
EXAMPLE LLW4-35ML-EU

LLW
MODEL
LLW LED Low Profile Wrap

SIZE
2 1x2 Nominal
4 1x4 Nominal

COLOR TEMP
35 3500K
40 4000K

LUMEN OUTPUT
LW Low
ML Medium

DRIVER OUTPUT
E Fixed
ED Bi-Level1

DRIVER VOLTAGE
U Universal
120/277 VAC

OPTIONS
ELL14 Emergency Battery Backup3

CERTIFICATION

CSA listed for Canada and U.S. Tested to UL 1598 & UL 8750 standards.
Luminaires bear appropriate listing labels.
Emergency-equipped fixtures labeled UL 924.
Adheres to LM79, LM80 and TM21 industry standards.
DesignLights Consortium® (DLC) qualified.
Please refer to the DLC website for specific product qualifications at www.designlights.org.

APPLICATION
- Suitable for use with most wired or wireless lighting control systems
- Suitable for dry & damp locations:
  - Government buildings
  - Commercial areas
  - Task lighting
  - Schools
  - Hallways
  - Retail
  - Closets

WARRANTY
- Five-year warranty. (Terms and Conditions Apply)

MOUNTING ACCESSORIES
(ORDER SEPARATELY)
S18 18” Stem

DRAFT
## PHOTOMETRIC DATA

### PHOTOMETRIC DATA: LLW4-35ML-EU

All published luminaire photometric testing performed to IESNA LM-79-08 standards by a NVLAP certified lab.

<table>
<thead>
<tr>
<th>LUMINAIRE DATA</th>
<th>AVG. LUMINANCE (Candela/Sq. M.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LLW4-35ML-EU</td>
<td>0.0 22.5 45.0 67.5 90.0</td>
</tr>
<tr>
<td>Ballast</td>
<td>D310CQ50UNVA-A</td>
</tr>
<tr>
<td>Ballast Factor</td>
<td>1.00</td>
</tr>
<tr>
<td>Lamp</td>
<td>LED</td>
</tr>
<tr>
<td>Fixture Lumens</td>
<td>4693</td>
</tr>
<tr>
<td>Watts</td>
<td>52</td>
</tr>
<tr>
<td>Mounting</td>
<td>Surface</td>
</tr>
<tr>
<td>Shielding Angle</td>
<td>0° = 90 90° = 100</td>
</tr>
<tr>
<td>Luminous Opening in feet</td>
<td>3.99  Height: 0.67</td>
</tr>
</tbody>
</table>

### COEFFICIENTS OF UTILIZATION (%)

<table>
<thead>
<tr>
<th>RC</th>
<th>0</th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>50</th>
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<tbody>
<tr>
<td>RW</td>
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</table>

RCR = Room Cavity Ratio  \( RC = \) Effective Ceiling Cavity Reflectance  \( RW = \) Wall Reflectance

### ZONAL LUMEN SUMMARY

<table>
<thead>
<tr>
<th>Zone</th>
<th>Lumens</th>
<th>%Lamp</th>
<th>%Fixt</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-30</td>
<td>1058</td>
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<tr>
<td>0-90</td>
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### INDOOR CANDELA PLOT

Test: ITL79148  
Test Date: 09/23/13

---

### PHOTOMETRIC DATA: LLW4-35ML-EU

All published luminaire photometric testing performed to IESNA LM-79-08 standards by a NVLAP certified lab.

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<td>1262</td>
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<tr>
<td>0-60</td>
<td>1931</td>
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<td>79</td>
</tr>
<tr>
<td>0-90</td>
<td>2285</td>
<td>93</td>
<td>93</td>
</tr>
</tbody>
</table>

### INDOOR CANDELA PLOT

Test: ITL79148  
Test Date: 09/23/13

---
**FIXTURE DIMENSIONS**

**CROSS SECTION**

Ceiling

1/16"

2 13/16"

8 5/16"

**TOP VIEW**

24"

2"

1 1/4"

12"

24"

1 1/4"

**LUMEN PACKAGE OPTIONS**

<table>
<thead>
<tr>
<th>Proposed System</th>
<th>CRI</th>
<th>CCT</th>
<th>Lumens Per Fixture</th>
<th>Input Watts</th>
<th>Lumens Per Watt</th>
<th>CCT</th>
<th>Lumens Per Fixture</th>
<th>Input Watts</th>
<th>Lumens Per Watt</th>
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</thead>
<tbody>
<tr>
<td>LLW-2-LW</td>
<td>&gt;80</td>
<td>3500K</td>
<td>2367</td>
<td>25</td>
<td>96</td>
<td>4000K</td>
<td>2453</td>
<td>25</td>
<td>98</td>
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<tr>
<td>LLW-2-ML</td>
<td>&gt;80</td>
<td>3500K</td>
<td>4648</td>
<td>51</td>
<td>91</td>
<td>4000K</td>
<td>4739</td>
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<td>91</td>
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<tr>
<td>LLW-4-LW</td>
<td>&gt;80</td>
<td>3500K</td>
<td>2409</td>
<td>25</td>
<td>98</td>
<td>4000K</td>
<td>2459</td>
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<td>98</td>
</tr>
<tr>
<td>LLW-4-ML</td>
<td>&gt;80</td>
<td>3500K</td>
<td>4689</td>
<td>52</td>
<td>91</td>
<td>4000K</td>
<td>4873</td>
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<td>94</td>
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</tbody>
</table>

*Lumen values shown are initial delivered lumens tested at 25°C per IES LM-79 standards.

**OPERATING ENVIRONMENT**

<table>
<thead>
<tr>
<th>Proposed System</th>
<th>Min Temp</th>
<th>Max Temp</th>
</tr>
</thead>
<tbody>
<tr>
<td>LLW-2-LW</td>
<td>-30°C/-22°F</td>
<td>40°C/104°F</td>
</tr>
<tr>
<td>LLW-2-ML</td>
<td>-30°C/-22°F</td>
<td>40°C/104°F</td>
</tr>
<tr>
<td>LLW-4-LW</td>
<td>-30°C/-22°F</td>
<td>40°C/104°F</td>
</tr>
<tr>
<td>LLW-4-ML</td>
<td>-30°C/-22°F</td>
<td>40°C/104°F</td>
</tr>
</tbody>
</table>

**Application Notes**

1. Application temperatures are provided to ensure the longevity and performance of the driver and LEDs.
2. Results are based off the In-Situ Temperature Measurement Test (ISTMT) along with the drivers' temperature and life curves.
3. Optional emergency battery equipped units have a minimum temperature of 10°C.
4. Precision-Paragon [P2]'s 5 year warranty assumes operation at the maximum ambient temperature range.
**SPECIFICATIONS**

**Features**
- This handy wrap is an excellent choice for hallways, closets, utility rooms, back-of-house locations and low ceiling areas.
- Diffuser features flat bottom, vertical sides and interior overlay providing uniformity without pixilation.
- Surface mount or stem suspended.
- Choice of two lumen packages and dimming option available.
- Long-life, LEDs at L70 (70% lumen maintenance) at 50,000 hours to reduce life cycle maintenance costs.
- Optional emergency battery backup for safety lighting.
- Available in 2’ and 4’ lengths.
- Up to 100 lumens per watt.
- Color Rendering Index (CRI) > 80.

**Construction**
- Heavy gauge steel housing, die embossed for maximum rigidity
- Prismatic acrylic diffuser with overlay hinges from either side
- Certain airborne contaminants can diminish integrity of acrylic. Contact factory for chemical compatibility.
- LED boards and driver accessible for future maintenance or upgrades
- Weight: 1x2 - 5 lbs. 1x4 - 10 lbs.

**Electrical**
- Input Voltage Range: 120-277 VAC Nom.
- Frequency: 50/60 Hz Nom.
- Active Power Factor Correction
- Power Factor: >0.90 @ full load, 120V through 277V
- Harmonic Distortion: THD < 20% @ full load
- Protection: Over-Voltage, Over-Temperature (110º) & Short Circuit
- Compliant to FCC Part 15 requirements for EMI/RFI emissions
- NEC/CEC compliant ballast disconnect is standard.
- Optional emergency battery pack
- CSA listed for Canada and U.S. Tested to UL 1598 & UL 8750 standards.
- Luminaires bear appropriate listing labels.
- Emergency-equipped fixtures labeled UL 924.
- Adheres to LM79, LM80 and TM21 industry standards.
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- Please refer to the DLC website for specific product qualifications at www.designlights.org.

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- Suitable for use with most wired or wireless lighting control systems
- Suitable for dry & damp locations:
  - Government buildings
  - Commercial areas
  - Task lighting
  - Retail
  - Schools
  - Hallways
  - Closets

**Warranty**
- Five-year warranty. (Terms and Conditions Apply)

**CERTIFICATION**

**ORDERING INFORMATION**

**EXAMPLE LLW4-35ML-EU**

<table>
<thead>
<tr>
<th>MODEL</th>
<th>SIZE</th>
<th>COLOR TEMP</th>
<th>LUMEN OUTPUT</th>
<th>DRIVER OUTPUT</th>
<th>DRIVER VOLTAGE</th>
<th>OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>LLW</td>
<td>2</td>
<td>3500K</td>
<td>LW Low</td>
<td>E Fixed</td>
<td>U Universal</td>
<td>ELL14</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>4000K</td>
<td>ML Medium</td>
<td>0-10V Dimming</td>
<td>120/277 VAC</td>
<td></td>
</tr>
</tbody>
</table>

**FOOTNOTES**

1 Bi-Level driver must be controlled by sensor or A/B switching.
2 Must be used in conjunction with lighting controls.
3 Only available in 4 ft.
PHOTOMETRIC DATA

PHOTOMETRIC DATA: LLW2-40LW-EU
All published luminaire photometric testing performed to IESNA LM-79-08 standards by a NVLAP certified lab.

LUMINAIRE DATA
Luminaire
LLW2-40LW-EU LED Low Profile Wrap
Ballast D50CCQ25UNVA-A
Ballast Factor 1.00
Lamp LED
Fixture Lumens 2455
Watts 25
Mounting Surface
Shielding Angle N.A.
Spacing Criterion 0° = 1.19 90° = 1.09
Luminous Opening in feet Length: 1.99 Width: 0.67 Height: 0.14

COEFFICIENTS OF UTILIZATION (%)

<table>
<thead>
<tr>
<th>Zone</th>
<th>0°</th>
<th>10°</th>
<th>20°</th>
<th>30°</th>
<th>40°</th>
<th>50°</th>
<th>60°</th>
<th>70°</th>
<th>80°</th>
<th>90°</th>
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</table>

ZONAL LUMEN SUMMARY

<table>
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<tr>
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<tr>
<td>0-30</td>
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<tr>
<td>0-40</td>
<td>1262</td>
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<tr>
<td>0-50</td>
<td>1931</td>
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<tr>
<td>0-60</td>
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</table>

INDOOR CANDELA PLOT

PHOTOMETRIC DATA

PHOTOMETRIC DATA: LLW4-35ML-EU
All published luminaire photometric testing performed to IESNA LM-79-08 standards by a NVLAP certified lab.

LUMINAIRE DATA
Luminaire
LLW4-35ML-EU LED Low Profile Wrap
Ballast D30CCQ50UNVA-A
Ballast Factor 1.00
Lamp LED
Fixture Lumens 4693
Watts 52
Mounting Surface
Shielding Angle 0° = 90° 90° = 90°
Spacing Criterion 0° = 1.19 90° = 1.10
Luminous Opening in feet Length: 3.99 Width: 0.67 Height: 0.14

COEFFICIENTS OF UTILIZATION (%)

<table>
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<tr>
<th>Zone</th>
<th>0°</th>
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<td>77</td>
<td>67</td>
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<tr>
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<td>93</td>
<td>93</td>
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</tbody>
</table>

INDOOR CANDELA PLOT
**LLW LED Low Profile Wrap**

### Fixture Dimensions

**CROSS SECTION**

- Ceiling: 1/16"
- A: 5/16" Diameter Mounting Holes
- B: 7/8" Diameter Knockouts
- C: 2" Diameter Knockouts

**TOP VIEW**

- 24" x 2" x 1 1/4"
- 48" x 2" x 1 1/4"

**OPERATING ENVIRONMENT**

<table>
<thead>
<tr>
<th>Proposed System</th>
<th>Min Temp</th>
<th>Max Temp</th>
</tr>
</thead>
<tbody>
<tr>
<td>LLW2-LW</td>
<td>-30°C/-22°F</td>
<td>40°C/104°F</td>
</tr>
<tr>
<td>LLW2-ML</td>
<td>-30°C/-22°F</td>
<td>40°C/104°F</td>
</tr>
<tr>
<td>LLW4-LW</td>
<td>-30°C/-22°F</td>
<td>40°C/104°F</td>
</tr>
<tr>
<td>LLW4-ML</td>
<td>-30°C/-22°F</td>
<td>40°C/104°F</td>
</tr>
</tbody>
</table>

*Application Notes*

1. Application temperatures are provided to ensure the longevity and performance of the driver and LEDs.
2. Results are based off the In-Situ Temperature Measurement Test (ISTMT) along with the drivers' temperature and life curves.
3. Optional emergency battery equipped units have a minimum temperature of 10°C.
4. Precision-Paragon [P2]'s 5 year warranty assumes operation at the maximum ambient temperature range.
PKG-304-SL-DM
304 Series™ Parking Structure Luminaire – Sparkle Petroleum – Direct Mount

Product Description
Slim, low profile design. Luminaire is constructed from rugged die cast and extruded aluminum components. LED driver is mounted in a sealed weathertight center chamber that allows for access from below the luminaire. High performance aluminum heat sinks specifically designed for LED parking structure application. Mounting brackets designed to mount directly over existing single gang and octagonal junction boxes for direct mount.

Performance Summary
Utilizes BetaLED® Technology
Patented NanoOptic® Product Technology
Made in the U.S.A. of U.S. and imported parts
CRI: Minimum 70 CRI
CCT: 5700K (+ / - 500K) Standard, 4000K (+ / - 300K)

Limited Warranty*: 10 years on luminaire / 10 years on Colorfast DeltaGuard® finish

Ordering Information
Example: PKG-304-SL-DM-04-E-UL-SV-350-OPTIONS

<table>
<thead>
<tr>
<th>PKG-304</th>
<th>SL</th>
<th>DM</th>
<th>LED Count (x10)</th>
<th>Series</th>
<th>Voltage</th>
<th>Color Options</th>
<th>Drive Current</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>PKG-304</td>
<td>SL Sparkle Petroleum</td>
<td>DM Direct Mount</td>
<td>04 06</td>
<td>E</td>
<td>UL Universal 120–277V</td>
<td>SV Silver (Standard)</td>
<td>700 700mA (Standard)</td>
<td>40K 4000K Color Temperature</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E</td>
<td>Universal 347–480V</td>
<td>WH White</td>
<td>525 525mA</td>
<td>DIM 0–10V Dimming</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E</td>
<td></td>
<td>BK Black</td>
<td>350 350mA</td>
<td>- Control by others</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E</td>
<td></td>
<td>BZ Bronze</td>
<td></td>
<td>- Refer to dimming spec sheet for availability and additional information</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E</td>
<td></td>
<td>PB Platinum</td>
<td></td>
<td>- Can't exceed specified drive current</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E</td>
<td></td>
<td>Bronze</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E</td>
<td></td>
<td>BZ Bronze</td>
<td></td>
<td>F Fuse</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>E</td>
<td></td>
<td>PB Platinum</td>
<td></td>
<td>- When code dictates fusing use time delay fuse</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E</td>
<td></td>
<td>Bronze</td>
<td></td>
<td>- Not available with all multi-level options. Refer to multi-level spec sheet for availability and additional information</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E</td>
<td></td>
<td>BZ Bronze</td>
<td></td>
<td>ML Multi-Level</td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
<td>E</td>
<td></td>
<td>PB Platinum</td>
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<td>- Refer to multi-level spec sheet for availability and additional information</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E</td>
<td></td>
<td>Bronze</td>
<td></td>
<td>J Alternate Junction Box mounting</td>
</tr>
</tbody>
</table>

* See www.cree.com/lighting/products/warranty for warranty terms
**Product Specifications**

**CONSTRUCTION & MATERIALS**
- Slim, low profile design
- Constructed from rugged die cast and extruded aluminum components
- LED driver is mounted in a sealed weathertight center chamber that allows for access from below the luminaire
- High performance heat sinks specifically designed for LED parking structure application
- Mounting bracket is designed to mount directly over existing single gang and octagonal junction boxes for direct mount
- Exclusive Colorfast DeltaGuard® finish features an E-Coat epoxy primer with an ultra-durable powder topcoat, providing excellent resistance to corrosion, ultraviolet degradation and abrasion. Standard is silver. Bronze, black, white, and platinum bronze are also available

**ELECTRICAL SYSTEM**
- Input Voltage: 120–277V or 347–480V, 50 / 60Hz, Class 1 drivers
- Power Factor: > 0.9 at full load
- Total Harmonic Distortion: < 20% at full load
- Integral 10kV surge suppression protection standard
- To address inrush current, slow blow fuse or type C / D breaker should be used

**REGULATORY & VOLUNTARY QUALIFICATIONS**
- cULus Listed
- Suitable for wet locations
- Enclosure rated IP66 per IEC 60529
- Consult factory for CE Certified products
- 10kV surge suppression protection tested in accordance with IEEE / ANSI C62.412
- Luminaire and finish endurance tested to withstand 5,000 hours of elevated ambient salt fog conditions as defined in ASTM Standard B 117
- Pending product qualification on the DesignLights Consortium (“DLC”) Qualified Products List (“QPL”)
- RoHS Compliant
- Meets Buy American requirements within ARRA

---

**Photometry**

All published luminaire photometric testing performed to IESNA LM-79-08 standards by a NVLAP certified laboratory.

**IES Files**
To obtain an IES file specific to your project consult:

---

### Lumen Output, Electrical, and Lumen Maintenance Data

<table>
<thead>
<tr>
<th>LED Color</th>
<th>700K</th>
<th>4000K</th>
<th>System Watts 120-480V</th>
<th>TOTAL CURRENT</th>
<th>50K Hours Projected Lumen Maintenance Factor*** @ 15°C (59°F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LED Count (x100)</td>
<td>Initial Delivered Lumens*</td>
<td>BUG Ratings** Par TM-15-11</td>
<td>Initial Delivered Lumens*</td>
<td>BUG Ratings** Par TM-15-11</td>
<td>120V</td>
</tr>
<tr>
<td>D4</td>
<td>5,243</td>
<td>B2 U0 G1</td>
<td>5,048</td>
<td>B2 U0 G1</td>
<td>46</td>
</tr>
<tr>
<td>D6</td>
<td>7,803</td>
<td>B3 U0 G1</td>
<td>7,514</td>
<td>B3 U0 G1</td>
<td>69</td>
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<tr>
<td>525mA @ 25°C (77°F)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D4</td>
<td>7,340</td>
<td>B2 U0 G1</td>
<td>7,068</td>
<td>B2 U0 G1</td>
<td>71</td>
</tr>
<tr>
<td>D6</td>
<td>10,516</td>
<td>B3 U0 G1</td>
<td>10,071</td>
<td>B3 U0 G1</td>
<td>101</td>
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<tr>
<td>700mA @ 25°C (77°F)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D4</td>
<td>8,912</td>
<td>B3 U1 G1</td>
<td>8,582</td>
<td>B3 U1 G1</td>
<td>96</td>
</tr>
<tr>
<td>D6</td>
<td>13,208</td>
<td>B3 U1 G1</td>
<td>12,773</td>
<td>B3 U1 G1</td>
<td>135</td>
</tr>
</tbody>
</table>

* Actual production yield may vary between -4 and +10% of initial delivered lumens.
*** For recommended lumen maintenance factor data see TD-13. Calculated L70 based on 6,000 hours LM-80-08 testing > 100,000 hours.

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www.cree.com/lighting
T (800) 236-6800 F (262) 504-5415
### PKG-304-SL-DM

#### 304 Series™ Parking Structure Luminaire – Sparkle Petroleum – Direct Mount

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<tr>
<th>PKG-304</th>
<th>SL Sparkle Petroleum</th>
<th>DM Direct Mount</th>
<th>LED Count (x10)</th>
<th>Series Voltage</th>
<th>Color Options</th>
<th>Drive Current</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>PKG-304</td>
<td>SL 04</td>
<td>DM 06</td>
<td>E</td>
<td>700 700mA (Standard)</td>
<td>40K 4000K Color Temperature</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **DIM**
  - 0-10V Dimming
    - Control by others
    - Refer to dimming spec sheet for availability and additional information
    - Can't exceed specified drive current
- **F**
  - Fuse
    - When code dictates fusing use time delay fuse
    - Not available with all multi-level options. Refer to multi-level spec sheet for availability and additional information
- **ML**
  - Multi-Level
    - Refer to multi-level spec sheet for availability and additional information
- **J**
  - Alternate Junction Box mounting

**See www.cree.com/lighting/products/warranty for warranty terms**
Product Specifications

CONSTRUCTION & MATERIALS
- Slim, low profile design
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<td>Initial Delivered Lumens*</td>
<td>BUG Ratings**</td>
<td>Initial Delivered Lumens*</td>
<td>BUG Ratings**</td>
<td>120V</td>
<td>208V</td>
</tr>
<tr>
<td>350mA @ 25˚C (77 F)</td>
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<td></td>
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<tr>
<td>D4</td>
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<td>D6</td>
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<td>73</td>
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<tr>
<td>525mA @ 25˚C (77 F)</td>
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<td></td>
<td></td>
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<tr>
<td>D4</td>
<td>7,340</td>
<td>B2 U0 G1</td>
<td>7,068</td>
<td>B2 U0 G1</td>
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<td>D6</td>
<td>10,254</td>
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<td>10,058</td>
<td>B3 U0 G1</td>
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<tr>
<td>700mA @ 25˚C (77 F)</td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>D4</td>
<td>8,912</td>
<td>B3 U0 G1</td>
<td>8,582</td>
<td>B3 U0 G1</td>
<td>94</td>
</tr>
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<td>11,874</td>
<td>B5 U0 G1</td>
<td>115</td>
</tr>
</tbody>
</table>

* Actual production yield may vary between -4 and +10% of initial delivered lumens.
*** For recommended lumen maintenance factor data see TD-13. Calculated L70 based on 6,000 hours LM-80-08 testing > 50,000 hours.
**Ordering Information**

**Dimensional Details**

**PMLED**

Maximum weight: 40lbs (18kg) Knuckle  
Maximum weight: 47lbs (21kg) Yoke  
Maximum E.P.A.: 3.1 sq. ft.

**PLLED**

Maximum weight: 54lbs (24kg) Knuckle  
Maximum weight: 65lbs (29kg) Yoke  
Maximum E.P.A.: 3.8 sq. ft.

**Performance Specifications**

**Optical**
Performance of the PMLED is to replace 400-1,000 watt MH luminaires. Performance of the PLLED is to replace 750-1000 watt HID product.
The optical system utilizes state-of-the-art COB (chip-on-board) technology with 3000K, 4000K and 5000K color temperature choices and a 70 CRI minimum color temperature. The luminaire uses a highly specular internal reflector designed for superior field to beam ratios, uniformity and spacing. NEMA beam pattern choices of 4X4, 4X5, 5X5, 6X5, and 6X6 are available. Optional shielding is available to control uplight and light trespass. The optical enclosure is a borosilicate prismatic glass lens.

**Electrical**
Long Life: LED light engines are rated > 100,000 hours at 25C, L70. Electronic driver has a rated life of 100,000 hour at a 25C ambient. Surge protection device provides IEEE/ANSIc62.4 Category C (10kV/5kA) level of protection.

**Mechanical**
Rugged low copper A360 alloy die-cast aluminum housing has integral heat sink fins to optimize thermal management through conductive and convection cooling. The housings are painted with a super durable polyester paint finish over an epoxy primer pretreat yielding a finish that achieves a scribe creepage of 8 after 5,000 hours exposure to salt spray, providing durability and corrosion resistance.

The luminaire is available in either knuckle mount or yoke mount. The knuckle mount is adjustable and is designed to fit 2.375 inch to 2.875 inch tenons. The yoke mount is available in either galvanized steel or stainless steel. The luminaire comes standard prewired eliminating the need for opening the unit during installation. The knuckle version is pre-wired to the wiring chamber at the fitter.

The yoke mount has provision for a pre-wired cord drop to specified length in the ordering information. The luminaire comes standard with the door frame bolted to the housing. Optional tool-less stainless steel latches are available to allow easy access to LED drivers, surge protection, and terminal block. The optical enclosure is sealed and gasketed to an IP66 rating.

**Controls**
The NEMA three pin locking-style photocontrol receptacle and an optional five pin receptacle is available. Dimming version uses proprietary Acuity Brands components to enable continuous 0-10V dimming down to 10% output via the ROAM smart controls system (optional). Photocontrol for solid-state lighting meets ANSI C136.10 criteria.

**Warranty & Standards**
Rated for -40C to 35C ambient  
UL 1598 A wet location, UL 1598A Marine
**Operating Characteristics**

The Predator LED is a direct replacement for installed high intensity discharge (HID) flood lights. The chart below gives general guidance on replacement of the Predator LED to HID luminaires.

### Most Frequently Ordered Catalog Numbers

**PMLED**
- **1** Luminaire
- **6** LED Modules
  - PMLED
  - PLLed

**5K**
- **6** Color Temp
  - 3K
  - 4K
  - 5K

**10A**
- **4** Drive Current
  - 10A

**AH**
- **5** Voltage
  - A5
  - A4

**44**
- **6** Beam Pattern
  - 44
  - 45
  - 55
  - 65
  - 66

**1**
- **7** Mounting
  - 1
  - 3
  - 4

**K**
- **8** UL Category
  - K

**BP**
- **9** Color
  - BP
  - GP
  - HP
  - WP
  - ZP

---

### Catalog Numbers for Entire Product Offering

(Pricing and lead times may be affected)

#### Preferred Selections:

#### Step 1: Luminaire
- PMLED Predator LED Medium
- PLLed Predator LED Large

#### Step 2: LED Modules
- 4 x 4 Modules
- 5 x 5 Modules
- 6 x 6 Modules
- 7 x 7 Modules
- 8 x 8 Modules
- 9 x 9 Modules

#### Step 3: Color Temp
- 3K 3,000K
- 4K 4,000K
- 5K 5,000K

#### Step 4: Drive Current
- 10A 1050mA Driver

#### Step 5: Voltage
- A5 Auto-sensing voltage (120-277V)
- A4 Auto-sensing voltage (347-480V)

#### Step 6: Beam Pattern
- 4K 4x4 (Prismatic glass)
- 45 4x5 (Prismatic glass)
- 55 5x5 (Prismatic glass)
- 65 6x5 (Prismatic glass)
- 66 6x6 (Prismatic glass)

#### Step 7: Mounting
- 1 Tenon slipfitter-knuckle
- 3 Yoke Stainless Steel
- 4 Yoke galvanized

#### Step 8: UL Category
- K Wet locations
- L2 Marine Outside

#### Step 9: Color
- BP Black Super durable with epoxy primer
- GP Gray Super durable with epoxy primer
- HP Graphite Super durable with epoxy primer
- WP White Super durable with epoxy primer
- ZP Bronze Super durable with epoxy primer

*Colors are just a representation. Custom colors are available upon request.

#### Step 10: Cord Length Option
- 04 4' cord length
- 12 12' cord length
- 15 15' cord length
- 20 20' cord length
- 25 25' cord length
- 30 30' cord length

#### Step 11: Cord Type
- 63 16 gage, 3 conductor
- 43 14 gage, 3 conductor
- 23 12 gage, 3 conductor

#### Step 12: Options (continued)
- 05 5' cord length
- 15 15' cord length
- 20 20' cord length
- 25 25' cord length
- 30 30' cord length

#### Step 12: Options (Continued)
- P5 **ANSI standard locking style for on/off operation**

#### Step 12: Accessories
- PMLED FV-XX Full visor super durable with epoxy primer
- PMLED UBV-XX Upper/bottom visor super durable with epoxy primer
- PMLED VG Vandal guard
- PMLED WDG Wire guard
- 08657-XX Yoke to 2.375" OD tenon adapter, super durable paint with epoxy primer
- 08755-XX Yoke to 2.375" OD tenon adapter with photocontrol receptacle, super durable paint with epoxy primer

<table>
<thead>
<tr>
<th>Replacement</th>
<th>HID Wattage CWA Type</th>
<th>Modules</th>
<th>Lumens</th>
<th>LED Wattage</th>
<th>LPW</th>
<th>Savings</th>
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<tbody>
<tr>
<td>PLLed 1000 HPS</td>
<td>1100</td>
<td>9 COB/10A</td>
<td>48,000</td>
<td>391</td>
<td>123</td>
<td>64%</td>
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<tr>
<td>PMLED 1000 MH</td>
<td>1070</td>
<td>6 COB/10A</td>
<td>32,000</td>
<td>261</td>
<td>123</td>
<td>75%</td>
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<tr>
<td>PMLED 750 MH</td>
<td>820</td>
<td>6 COB/10A</td>
<td>32,000</td>
<td>261</td>
<td>123</td>
<td>68%</td>
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<tr>
<td>PMLED 400 HPS</td>
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<td>4 COB/10A</td>
<td>22,000</td>
<td>177</td>
<td>123</td>
<td>61%</td>
</tr>
</tbody>
</table>

1. Available with PMLED only
2. Available with PLLed only
3. Must be used with P3 or P5
4. Not available with P5 option
5. Not available with T5 option
6. Available with mounting 3 and 4 only
7. PMLED Not Available with T5 option
8. PMLED Not Available with TB option
9. Accepts 3-pin and 5-pin as well. The 5-pin controls fixture dimming.
**Ordering Information**

**Dimensional Details**

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- Maximum weight: 47lbs (21kg) Yoke
- Maximum E.P.A.: 3.1 sq. ft.

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Performance of the PMLED is to replace 400-1,000 watt MH luminaires. Performance of the PLLED is to replace 750-1000 watt HID product. The optical system utilizes state-of-the-art COB (chip-on-board) technology with 3000K, 4000K and 5000K color temperature choices and a 70 CRI minimum color temperature. The luminaire uses a highly specular internal reflector designed for superior field to beam ratios, uniformity and spacing. NEMA beam pattern choices of 4X4, 4X5, 5X5, 6X5, and 6X6 are available. Optional shielding is available to control uplight and light trespass. The optical enclosure is a borosilicate prismatic glass lens.

**Electrical**
Long Life: LED light engines are rated > 100,000 hours at 25° C, L70. Electronic driver has a rated life of 100,000 hour at a 25°C ambient. Surge protection device provides IEEE/ANSIc62.4 Category C (10kV/5kA) level of protection.

**Mechanical**
Rugged low copper A360 alloy die-cast aluminum housing has integral heat sink fins to optimize thermal management through conductive and convection cooling. The housings are painted with a super durable polyester paint finish over an epoxy primer pretreat yielding a finish that achieves a scribe creepage of 8 after 5,000 hours exposure to salt spray, providing durability and corrosion resistance.

The luminaire is available in either knuckle mount or yoke mount. The knuckle mount is adjustable and is designed to fit 2.375 inch to 2.875 inch tenons. The yoke mount is available in either galvanized steel or stainless steel. The luminaire comes standard prewired eliminating the need for opening the unit during installation. The knuckle version is pre-wired to the wiring chamber at the fitter.

The yoke mount has provision for a pre-wired cord drop to specified length in the ordering information. The luminaire comes standard with the door frame bolted to the housing. Optional tool-less stainless steel latches are available to allow easy access to LED drivers, surge protection, and terminal block. The optical enclosure is sealed and gasketed to an IP66 rating.

**Controls**
The NEMA three pin locking-style photocontrol receptacle and an optional five pin receptacle is available. Dimming version uses proprietary Acuity Brands components to enable continuous 0-10V dimming down to 10% output via the ROAM smart controls system (optional). Photocontrol for solid-state lighting meets ANSI C136.10 criteria

**Warranty & Standards**
Rated for -40C to 35C ambient
UL 1598 A wet location, UL 1598A Marine
**Preferred Selections:**

Most Frequently Ordered Catalog Numbers

<table>
<thead>
<tr>
<th>PMLED</th>
<th>6</th>
<th>5K</th>
<th>10A</th>
<th>AH</th>
<th>44</th>
<th>1</th>
<th>K</th>
<th>BP</th>
</tr>
</thead>
<tbody>
<tr>
<td>LUMINAIRE</td>
<td>LED Modules</td>
<td>COLOR TEMP</td>
<td>DRIVE CURRENT</td>
<td>VOLTAGE</td>
<td>BEAM PATTERN</td>
<td>MOUNTING</td>
<td>UL CATEGORY</td>
<td>COLOR</td>
</tr>
<tr>
<td>PMLED</td>
<td>4 Modules</td>
<td>7</td>
<td>3K</td>
<td>10A</td>
<td>AS</td>
<td>1</td>
<td>K</td>
<td>BP</td>
</tr>
<tr>
<td>PMLED</td>
<td>6 Modules</td>
<td>8</td>
<td>4K</td>
<td></td>
<td>AH</td>
<td>3</td>
<td>BP</td>
<td></td>
</tr>
<tr>
<td>PMLED</td>
<td>5 Modules</td>
<td>9</td>
<td>5K</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PMLED</td>
<td>7 Modules</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PMLED</td>
<td>8 Modules</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PMLED</td>
<td>9 Modules</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Catalog Numbers for Entire Product Offering**
(Pricing and lead times may be affected)

**STEP 1: LUMINAIRE**
- PMLED: Predator LED Medium
- PMLE: Predator LED Large

**STEP 2: LED MODULES**
- 4K: 4 Modules
- 6K: 6 Modules
- 5K: 5 Modules
- 4K: 7 Modules
- 6K: 8 Modules
- 5K: 9 Modules

**STEP 3: COLOR TEMP**
- 3K: 3,000K
- 4K: 4,000K
- 5K: 5,000K

**STEP 4: DRIVE CURRENT**
- 10A: 1050mA Driver

**STEP 5: VOLTAGE**
- AS: Auto-sensing voltage (120-277V)
- AH: Auto-sensing voltage (347-480V)

**STEP 6: BEAM PATTERN**
- 44: 4x4 (Prismatic glass)
- 45: 4x5 (Prismatic glass)
- 55: 5x5 (Prismatic glass)
- 65: 6x5 (Prismatic glass)
- 66: 6x6 (Prismatic glass)

**STEP 7: MOUNTING**
- 1: Tenon slipfitter-knuckle
- 3: Yoke Stainless Steel
- 4: Yoke galvanized

**STEP 8: UL CATEGORY**
- K: Wet locations
- L: Marine Outside

**STEP 9: COLOR**
- BP: Black Super durable with epoxy primer
- GP: Gray Super durable with epoxy primer
- HP: Graphite Super durable with epoxy primer
- WP: White Super durable with epoxy primer
- ZP: Bronze Super durable with epoxy primer

**STEP 10: CORD LENGTH OPTION**
- 04: 4’ cord length
- 05: 5’ cord length
- 06: 6’ cord length
- 08: 8’ cord length
- 10: 10’ cord length

**Operating Characteristics**
The Predator LED is a direct replacement for installed high intensity discharge (HID) flood lights. The chart below gives general guidance on replacement of the Predator LED to HID luminaires.

<table>
<thead>
<tr>
<th>Replacement</th>
<th>HID Wattage CWA Type</th>
<th>Modules</th>
<th>Lumens</th>
<th>LED Wattage</th>
<th>LPW</th>
<th>Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>PMLED 1000 HPS</td>
<td>1100</td>
<td>9 COB/10A</td>
<td>48,000</td>
<td>391</td>
<td>123</td>
<td>64%</td>
</tr>
<tr>
<td>PMLED 1000 MH</td>
<td>1070</td>
<td>6 COB/10A</td>
<td>32,000</td>
<td>261</td>
<td>123</td>
<td>75%</td>
</tr>
<tr>
<td>PMLED 750 MH</td>
<td>820</td>
<td>6 COB/10A</td>
<td>32,000</td>
<td>261</td>
<td>123</td>
<td>68%</td>
</tr>
<tr>
<td>PMLED 400 HPS</td>
<td>464</td>
<td>4 COB/10A</td>
<td>22,000</td>
<td>177</td>
<td>123</td>
<td>61%</td>
</tr>
</tbody>
</table>
6" LED Open Downlight
RLF6LEDG4
120V–277V
0-10V Dimming

APPLICATIONS:
LiteFrame Retrofit RLF6LED is a 6" specification grade Retrofit LED retrofit downlight that combines superior brightness control with energy savings and low maintenance costs. The RLF6LED is designed specifically to retrofit into ceilings with existing recessed downlight fixtures without the need to remove the existing fixture. Suitable for a variety of commercial, retail, and institutional applications with ambient temperature up to 40°C (104°F) in open plenum applications.

HOUSING:
All components are made from quality die cast aluminum or galvaneal steel. Pre-wired J-box with snap-on cover for easy access. Snap-in connection from driver compartment allows easy installation of light engine/trim assembly without tools above or below the ceiling and can be upgraded to accommodate technology improvements. Approve for 8 (4 in/4 out) No. 12 AWG conductors rated for 90°C through wiring.

INSTALLATION:
All installation can be performed from below the ceiling without removing existing fixture.

REFLECTOR:

LED LIGHT ENGINE:
The RLF6LED uses the Philips Fortimo DLM Gen 4 LED Module with remote phosphor technology. This technology provides controlled color consistency (3 SCDM) from fixture to fixture. The system is designed for optional life and lumen maintenance (>50,000 hours at 70% lumen maintenance). Both reflector and light engine assembly are mechanically retained to housing. The light engine comes standard with 80 CRI in all Kelvin temperatures.

LED DRIVER:
The RLF6LED utilizes the Philips Fortimo LED Driver specifically designed to optimize efficiency of the Fortimo DLM Module. Driver is designed to match the 50,000 hour minimum life expectancy of the system. Meets UL Class 2, inherent short circuit protection, self limited, overload protected. If critical temperatures are reached on driver or LED module, integrated thermal feedback loop will gradually reduce current to protect system life. Driver is universal 120V/277V. Optional Lutron Series A driver is also available.

DIMMING:
Comes standard with 0-10V dimming capability. Flicker-free dimming to 10%. 0-10V control may consume up to 1mA. 0-10V, Lutron 2 wire, 3 wire, and EcoSystem dimming available to 1%.

CERTIFICATIONS:
CSA certified to US and Canadian safety standards. Suitable for wet locations. Approved for through wiring. Non-IC rated. ENERGY STAR qualified with open clear Alzak reflector.

WARRANTY:
5 year warranty. See www.prescolite.com for details.

CATALOG NUMBER:
Order housing, reflector, and accessories separately.

HOUSING/LED GENERATION VOLTAGE OPTIONS

<table>
<thead>
<tr>
<th>HOUSING/LED GENERATION</th>
<th>VOLTAGE</th>
<th>OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>RLF6LEDG4 6&quot; High Efficacy LED Housing</td>
<td>120V–277V</td>
<td>Blank, SD</td>
</tr>
</tbody>
</table>

LED LIGHT ENGINE

<table>
<thead>
<tr>
<th>TRIM LED COLOR</th>
<th>LED TEMPERATURE</th>
<th>REF. FINISH</th>
<th>LOWER REF. COLOR</th>
<th>LOWER OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>6LF6LED5G4 1100 Lumen Module</td>
<td>30K Blank, Semi-Diffuse</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6LF6LED6G4 1500 Lumen Module</td>
<td>35K Blank, Semi-Diffuse</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6LF6LED7G4 2000 Lumen Module</td>
<td>40K Blank, Semi-Diffuse</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Use with HDM/DM1/2DM dimming option: Match Housing to Trim Output

<table>
<thead>
<tr>
<th>HOUSING/LED GENERATION</th>
<th>VOLTAGE</th>
<th>OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>RLF6LED5G4 120V</td>
<td>HDM2</td>
<td>100 Lumen Module</td>
</tr>
<tr>
<td>RLF6LED6G4 277V</td>
<td>2DM2</td>
<td>Lutron 2-wire Leading Edge to 1% (120V only)</td>
</tr>
<tr>
<td>RLF6LED7G4</td>
<td>SD1</td>
<td>0-10V dimming to 1%</td>
</tr>
</tbody>
</table>

ACCESSORIES

- LFSC6 6" reflector screw cover
- LiteGear See page 3 for availability
- RW66 Retrofit wide diameter housing kit

NOTES
1. See housing capability guide on page 3
2. Requires WT option also
3. For HDM, DM1, & 2DM options, housing output must match trim output

In a continuing effort to offer the best product possible we reserve the right to change, without notice, specifications or materials that in our opinion will not alter the function of the product.
Web: www.prescolite.com • Tech Support: (888) 777-4832
PHOTOMETRIC DATA

**Retroficient - 6" RLF6LEDG4 Downlight**

<table>
<thead>
<tr>
<th>DRIVER DATA</th>
<th>RLF6LED5G4 30K</th>
<th>RLF6LED7G4 30K</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input Voltage</td>
<td>120.277V</td>
<td>120.277V</td>
</tr>
<tr>
<td>Input Frequency</td>
<td>50/60 Hz</td>
<td>50/60 Hz</td>
</tr>
<tr>
<td>Input Current</td>
<td>0.12A (120v)</td>
<td>0.22A (120v)</td>
</tr>
<tr>
<td>Power Factor</td>
<td>0.052A (277v)</td>
<td>0.10A (277v)</td>
</tr>
<tr>
<td>Input Power</td>
<td>14.5W</td>
<td>26.5W</td>
</tr>
<tr>
<td>Constant Current Output</td>
<td>200-1000mA</td>
<td>200-1000mA</td>
</tr>
<tr>
<td>Power Factor</td>
<td>&gt;0.90</td>
<td>&gt;0.90</td>
</tr>
<tr>
<td>THD</td>
<td>&lt;20%</td>
<td>&lt;20%</td>
</tr>
<tr>
<td>EMI Filtering</td>
<td>FCC 47 CFR</td>
<td>FCC 47 CFR</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>-20°C to 40°C</td>
<td>-20°C to 40°C</td>
</tr>
<tr>
<td>Dimming</td>
<td>0-10V</td>
<td>0-10V</td>
</tr>
<tr>
<td><strong>Over-voltage, over-current, short-circuit protected</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Power consumption and photometric output may vary slightly with HDM or 2DM driver</em></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**RLF6LEDG4 6FLFEDSG4 30K**

- **LED Light Engine:** 3000K, 80 CRI
- **System Wattage:** 14.5W
- **Fixture Delivered Lumen:** 1157
- **Fixture Efficacy:** 80.0
- **Spacing Criteria:** 1.2

**ZONAL LUMEN SUMMARY**

<table>
<thead>
<tr>
<th>ZONE</th>
<th>LUMENS</th>
<th>%LUMINAIRE</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-30</td>
<td>602</td>
<td>52.0</td>
</tr>
<tr>
<td>0-40</td>
<td>967</td>
<td>83.6</td>
</tr>
<tr>
<td>0-60</td>
<td>1157</td>
<td>100.0</td>
</tr>
<tr>
<td>0-90</td>
<td>1157</td>
<td>100.0</td>
</tr>
<tr>
<td>0-180</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>0-180</td>
<td>1157</td>
<td>100.0</td>
</tr>
</tbody>
</table>

**LUMINANCE DATA IN CANDELA/SQ. METER**

<table>
<thead>
<tr>
<th>Angle in Vertical</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>45°</td>
<td>18290</td>
</tr>
<tr>
<td>55°</td>
<td>382</td>
</tr>
<tr>
<td>65°</td>
<td>0</td>
</tr>
<tr>
<td>75°</td>
<td>0</td>
</tr>
<tr>
<td>85°</td>
<td>0</td>
</tr>
</tbody>
</table>

**COEFFICIENTS OF UTILIZATION**

- **Zonal Cavity Method:**
- **% Effective Ceiling Cavity Reflectance:**
- **% Well Reflectance:**

**Room Cavity**

- **65%**
- **80%**
- **100%**

**Coeficients of Utilization**

**20% Effective Floor Cavity Reflectance**

**% Effective Ceiling Cavity Reflectance**

**% Effective Floor Cavity Reflectance**

**% Effective Wall Reflectance**

**% Effective Ceiling Reflectance**

**Part 15, Class A**

- **<20%**
- **≥0.90**

**Over-voltage, over-current, short-circuit protected**

**Test No. 8458**

Tested at 25°C Ambient in accordance to IESNA LM-79-2008

---

**RLF6LEDG4 6FLFED7G4 30K**

- **LED Light Engine:** 3000K, 80 CRI
- **System Wattage:** 26.4W
- **Fixture Delivered Lumen:** 2013
- **Fixture Efficacy:** 76.1
- **Spacing Criteria:** 1.2

**ZONAL LUMEN SUMMARY**

<table>
<thead>
<tr>
<th>ZONE</th>
<th>LUMENS</th>
<th>%LUMINAIRE</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-30</td>
<td>1053</td>
<td>52.3</td>
</tr>
<tr>
<td>0-40</td>
<td>1690</td>
<td>83.9</td>
</tr>
<tr>
<td>0-60</td>
<td>2013</td>
<td>100.0</td>
</tr>
<tr>
<td>0-90</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>0-180</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>0-180</td>
<td>1053</td>
<td>100.0</td>
</tr>
</tbody>
</table>

**LUMINANCE DATA IN CANDELA/SQ. METER**

<table>
<thead>
<tr>
<th>Angle in Vertical</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>45°</td>
<td>30302</td>
</tr>
<tr>
<td>55°</td>
<td>860</td>
</tr>
<tr>
<td>65°</td>
<td>259</td>
</tr>
<tr>
<td>75°</td>
<td>0</td>
</tr>
<tr>
<td>85°</td>
<td>0</td>
</tr>
</tbody>
</table>

**COEFFICIENTS OF UTILIZATION**

- **Zonal Cavity Method:**
- **% Effective Ceiling Cavity Reflectance:**
- **% Well Reflectance:**

**Room Cavity**

- **65%**
- **80%**
- **100%**

**Coeficients of Utilization**

**20% Effective Floor Cavity Reflectance**

**% Effective Ceiling Cavity Reflectance**

**% Effective Floor Cavity Reflectance**

**% Effective Wall Reflectance**

**% Effective Ceiling Reflectance**

**Part 15, Class A**

- **<20%**
- **≥0.90**

**Over-voltage, over-current, short-circuit protected**

**Test No. 8459**

Tested at 25°C Ambient in accordance to IESNA LM-79-2008
Retroficient - 6" RLF6LEDG4 Downlight

**Housing Compatibility Guide**

<table>
<thead>
<tr>
<th>Ordering Guidelines</th>
<th>6 Inch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Requires SD Housing Option</td>
<td>5-15/16 - 6-1/8</td>
</tr>
<tr>
<td>All Standard Housing</td>
<td>6-1/8 - 6-1/2</td>
</tr>
<tr>
<td>Requires RWD Kit Accessory &amp; WF Reflector Option</td>
<td>6-1/2 - 6-7/8</td>
</tr>
</tbody>
</table>

Dimensions shown are for the diameter of the frame flange at its narrowest point.

---

**Central Inverters**

For fixture full light output in back-up mode, Prescolite and Dual-lite have jointly tested the LiteFrame LED with the 100 (LG1) and 250 (LG2) VA LiteGear inverters. [Note: Not for use with integral EM option]. For more information on LiteGear go to [www.dual-lite.com/resources/litegear_luminaire_loading_chart/](http://www.dual-lite.com/resources/litegear_luminaire_loading_chart/)

---

**Dimming Compatibility Table**

<table>
<thead>
<tr>
<th>Dimming Ballast</th>
<th>Manufacturer</th>
<th>Web Link</th>
</tr>
</thead>
</table>
The SIL, LED strip, brings together an economical price point and High performance
- Strips are everywhere so what sets us apart?
- Multiple configurations to meet your project’s needs.
- Integrated Occupancy Sensors
- Adaptable to multiple control strategies: Dimming, Bi-level, High Frequency Sensors and more.

SIL LED Fixtures Deliver...
- Contoured lens and aesthetic look.
- Latest in LED efficiency, 92-98 lumens per watt.
- High color rendering (80+)
- TM-21 reported L70 of over 51,000 hours.

Why P2? It’s Simple, Our Experience
- We have seen that due to the poor lumen maintenance and low CRI inherent to F96T12 light sources, you can often do a better re-lighting job with fewer design lumens.
- Contact the factory for photometric support to get the most out of your delivered lumens.

**SIL - Standard LED Strip**

<table>
<thead>
<tr>
<th>SIL</th>
<th>1x4</th>
<th>ML</th>
<th>F</th>
<th>UL</th>
<th>40K</th>
<th>SH</th>
<th>C8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>Fixture Size</td>
<td>Lumen Output</td>
<td>Driver Output</td>
<td>Voltage</td>
<td>Color Temp.</td>
<td>Occ. Sensor</td>
<td>Cord &amp; Plug</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fixture Series</th>
<th>SIL = LED Strip Fixture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixture Size</td>
<td>1x4 = 1x4 Nominal</td>
</tr>
<tr>
<td></td>
<td>1x8 = 1x8 Nominal</td>
</tr>
<tr>
<td>Lumen Output</td>
<td>XL = Extra Low Wattage, 31W</td>
</tr>
<tr>
<td></td>
<td>LW = Low Wattage, High Efficiency, 51W</td>
</tr>
<tr>
<td></td>
<td>ML = Medium Lumen Output, 74W</td>
</tr>
<tr>
<td></td>
<td>HL = High Lumen Output, 96W</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Driver Output</th>
<th>F = Fixed Output</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DM = 0-10V Dimming (1)</td>
</tr>
<tr>
<td></td>
<td>BL = Bi-Level (2)v</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Voltage</th>
<th>UL = Universal 120-277</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Color Temperature</th>
<th>35K = 3500K</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>40K = 4000K</td>
</tr>
<tr>
<td></td>
<td>50K = 5000K</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Occupancy Sensor</th>
<th>SH = 360 View Hi-Bay Sensor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cord &amp; Plug</td>
<td>C8 = 8’ Cord, No Plug</td>
</tr>
<tr>
<td></td>
<td>CB/L715 = 8’ Cord &amp; Plug (L7-15P)</td>
</tr>
<tr>
<td></td>
<td>PQC15 = 15’ Cord/Quick Connect</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other</th>
<th>LSP = Lighting Surge Protector</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(270 Joules)</td>
</tr>
</tbody>
</table>

Notes
(1) Must be ordered in conjunction with lighting controls. Contact factory for assistance.
(2) Bi-level driver must be controlled by occupancy sensor or A/B switching. Contact factory for ordering assistance.
SIL - Standard LED Strip

Want Fluorescent?
Consider our...
RWS
SIH
SIS
with Long Life Lamps and PS Ballasts

Fixture Construction
- Heavy Duty .032 White Aluminum cover with 22GA steel 4.25” channel
- Linear Frosted Acrylic Diffuser.
- Class 2 Driver
- Suitable for end-to-end row lighting
- Made in the USA.

Existing System

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<td>40</td>
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<td>9,695</td>
<td>210</td>
<td>46</td>
</tr>
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<td>2L32-T8-MP Elec</td>
<td>2 F32T8/841</td>
<td>2,800</td>
<td>5,600</td>
<td>0.87</td>
<td>0.75</td>
<td>3,654</td>
<td>53</td>
<td>69</td>
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Re-Lighting Options

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<td>&gt;80</td>
<td>4500</td>
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<td>2,900</td>
<td>31</td>
<td>94</td>
</tr>
<tr>
<td>SL-1X4-LW</td>
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<td>&gt;80</td>
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General Notes
- Lamp/ballast system values shown are a general reference intended to supply a quick comparison of several common lamp/ballast systems, the associated energy consumption, and net lumens output.
- Fixture efficiencies and layout are not comprehended in the table, but will determine the usefulness of the system.
- Values shown are based on normal operating temperatures and at 277 volts.
- There are many operating variables that affect system output, in addition to rating variances from brand to brand.
- All T8 electronic ballast values shown are based on Ultra Efficient (aka 3rd Generation) T8 ballasts.
- All T5 and T8 lamp values shown are for basic grade lamps. Extended life and higher lumen lamps types are available.
- In addition to those shown there are a wide variety of systems to choose from, each with distinct features and cost points.
- Please consult the lamp/ballast manufacturer’s catalogs for the detailed information required to model your system.
SIL - Standard LED Strip

The SIL, LED strip, brings together an economical price point and High performance:
- Strips are everywhere so what sets us apart?
- Multiple configurations to meet your project’s needs.
- Integrated Occupancy Sensors
- Adaptable to multiple control strategies: Dimming, Bi-level, High Frequency Sensors and more.

SIL LED Fixtures Deliver:
- Contoured lens and aesthetic look.
- Latest in LED efficiency, 92-98 lumens per watt.
- High color rendering (80+)
- TM-21 reported L70 of over 51,000 hours.

Why P2? It’s Simple, Our Experience:
- We have seen that due to the poor lumen maintenance and low CRI inherent to F96T12 light sources, you can often do a better re-lighting job with fewer design lumens.
- Contact the factory for photometric support to get the most out of your delivered lumens.

SIL - 1x4 - ML - F - UL - 40K - SH - C8

<table>
<thead>
<tr>
<th>Model</th>
<th>Size</th>
<th>Lumen Output</th>
<th>Driver Output</th>
<th>Voltage</th>
<th>Color Temp.</th>
<th>Occ. Sensor</th>
<th>Cord Plug</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIL</td>
<td>1x4</td>
<td>XL</td>
<td>Fixed Output</td>
<td>UL</td>
<td>40K</td>
<td>SH</td>
<td>C8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NL</td>
<td>DM</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>LW</td>
<td>BL, Bi-Level</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes:
(1) Must be ordered in conjunction with lighting controls. Contact factory for assistance.
(2) Bi-level driver must be controlled by occupancy sensor or A/B switching. Contact factory for ordering assistance.

Driver Output:
- F = Fixed Output
- DM = 0-10V Dimming (1)
- BL = Bi-Level (2)v

Voltage:
- UL = Universal 120-277

Color Temperature:
- 35K = 3500K
- 40K = 4000K
- 50K = 5000K

Occumancy Sensor:
- SH = 360 View Hi-Bay Sensor

Cord & Plug:
- C8 = 8’ Cord, No Plug
- CB/L715 = 8’ Cord & Plug (L7-15P)
- PQC15 = 15’ Cord/Quick Connect

Other:
- LSP = Lighting Surge Protector (270 Joules)
SIL - Standard LED Strip

**Want Fluorescent?**

Consider our...

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with Long Life Lamps and PS Ballasts

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WP LED 13N/PC2

LED 10W & 13 Wallpacks. 3 cutoff options. Patent Pending thermal management system. 100,000 hour L70 lifespan. 5 Year Warranty.

LED Info

<table>
<thead>
<tr>
<th>Watts</th>
<th>13W</th>
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<tbody>
<tr>
<td>Color Temp</td>
<td>4000K (Neutral)</td>
</tr>
<tr>
<td>Color Accuracy</td>
<td>86</td>
</tr>
<tr>
<td>L70 Lifespan</td>
<td>100000</td>
</tr>
<tr>
<td>LM79 Lumens</td>
<td>673</td>
</tr>
<tr>
<td>Efficacy</td>
<td>45 LPW</td>
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</table>

Driver Info

<table>
<thead>
<tr>
<th>Type</th>
<th>Constant Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>120V:</td>
<td>N/A</td>
</tr>
<tr>
<td>208V:</td>
<td>0.08A</td>
</tr>
<tr>
<td>240V:</td>
<td>0.07A</td>
</tr>
<tr>
<td>277V:</td>
<td>0.06A</td>
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<tr>
<td>Input Watts</td>
<td>15W</td>
</tr>
<tr>
<td>Efficiency</td>
<td>87%</td>
</tr>
</tbody>
</table>

Technical Specifications

Photocell:
277V Photocell Included. Photocell is compatible with 208V-277V.

UL LISTING:
Suitable for Wet Locations as a Downlight. Suitable for Damp Locations as an Uplight. Wall Mount only. Suitable for Mounting within 4ft. of ground.

Lumen Maintenance:
The LED will deliver 70% of its initial lumens at 100,000 hours of operation.

Cold Weather Starting:
The minimum starting temperature is -40°F/-40°C.

Ambient Temperature:
Suitable for use in 50°C (122°F) ambient temperatures.

Driver:
Multi-chip 13W high output long life LED Driver Constant Current, Class 2 100V - 277V, 50/60 Hz.

Surge Protection:
4KV

Color Temperature (Nominal CCT):
4000K

Fixture Efficacy:
44.6 Lumens per Watt

Color Accuracy:
86 CRI

Finish:
Our environmentally friendly polyester powder coatings are formulated for high-durability and long-lasting color, and contains no VOC or toxic heavy metals.

Color Consistency:
3-step MacAdam Ellipse binning to achieve consistent fixture-to fixture color.

Color Stability:
LED color temperature is warrantied to shift no more than 200K in CCT over a 5 year period.

Color Uniformity:

Green Technology:
RAB LEDs are Mercury and UV free.

Dark Sky Approved:
The International Dark Sky Association has approved this product as a full cutoff, fully shielded luminaire.

For use on LEED Buildings:
IDA Dark Sky Approval means that this fixture can be used to achieve LEED Credits for Light Pollution Reduction.

Patents:
The design of the LPACK is protected by U.S. Pat. D604,004 and patents pending in Canada, China and Taiwan.

IESNA LM-79 & IESNA LM-80 Testing:
RAB LED luminaires have been tested by an independent laboratory in accordance with IESNA LM-79 and 80, and have received the Department of Energy "Lighting Facts" label.

Gaskets:
High Temperature Silicone.

Color: Bronze
Weight: 3.3 lbs
Warranty:
RAB warrants that our LED products will be free from defects in materials and workmanship for a period of five (5) years from the date of delivery to the end user, including coverage of light output, color stability, driver performance and fixture finish. See our full warranty.

Equivalency:
The WPLED13 is Equivalent in delivered lumens to a 100W Metal Halide Wallpack.

HID Replacement Range:
The WPLED13 can be used to replace 70-150W Metal Halide Wallpacks based on delivered lumens.

Country of Origin:
Designed by RAB in New Jersey and assembled in the USA by RAB's IBEW Local 3 workers.

Buy American Act Compliant:
This product is a COTS item manufactured in the United States, and is compliant with the Buy American Act.

Recovery Act (ARRA) Compliant:
This product complies with the 52.225-21 "Required Use of American Iron, Steel, and Manufactured Goods--Buy American Act-- Construction Materials (October 2010).

Trade Agreements Act Compliant:
This product is a COTS item manufactured in the United States, and is compliant with the Trade Agreements Act.

GSA Schedule:
Suitable in accordance with FAR Subpart 25.4.
LED 78W Wallpacks. 3 cutoff options. Patent Pending thermal management system. 100,000 hour L70 lifespan. 5 Year Warranty.

**Color:** Bronze  
**Weight:** 34.8 lbs

### Technical Specifications

#### Electrical

**Photocell:**  
277V Swivel Photocell Included. Photocell is compatible with 208V-277V.

**Driver:**  
Constant Current, Class 2, 2000mA, 50-60Hz, 1.1A, Power Factor 99%

**THD:**  
5.2% at 120V, 13.6% at 277V

**Surge Protection:**  
6kV

**Listings**

**DLC Listed:**  
This product is on the Design Lights Consortium (DLC) Qualified Products List and is eligible for rebates from DLC Member Utilities.  
DLC Product Code: P000017AL

**UL Listing:**  
Suitable for wet locations as a downlight.

**IESNA LM-79 & IESNA LM-80 Testing:**  
RAB LED luminaires have been tested by an independent laboratory in accordance with IESNA LM-79 and 80, and have received the Department of Energy “Lighting Facts” label.

**Dark Sky Approved:**  
The International Dark Sky Association has approved this product as a full cutoff, fully shielded luminaire.

#### LED Characteristics

**Lifespan:**  
100,000-hour LED lifespan based on IES LM-80 results and TM-21 calculations.

**LEDs:**  
Six (6) multi-chip, 13W, high-output, long-life LEDs.

**Color Consistency:**  
3-step MacAdam Ellipse binning to achieve consistent fixture-to-fixture color.

**Color Stability:**  
LED color temperature is warranted to shift no more than 200K in CCT over a 5 year period.

**Color Temperature (Nominal CCT):**  
4100K

**Color Uniformity:**  

**Replacement:**  
Replaces 400W Metal Halide.

#### Housing

**Die cast aluminum housing, lens frame and mounting arm.**

#### Reflector

**Specular vacuum-metallized polycarbonate**

#### Gaskets

**High temperature silicone gaskets.**

#### Finish

**Formulated for high-durability and long lasting color.**

#### Green Technology

**Mercury and UV free. RoHS compliant components. Polyester powder coat finish formulated without the use of VOC or toxic heavy metals.**

#### For use on LEED Buildings

**IDA Dark Sky Approval means that this fixture can be used to achieve LEED Credits for Light Pollution Reduction.**

#### Optical

**Specification Grade Optics:**  
The Type III distribution is ideal for roadway, general parking, and other area lighting applications where a larger pool of lighting is required. It is intended to be located near the side of the area, allowing the light to project outward and fill the area.

**BUG Rating:**  
B1 U0 G2
Technical Specifications (continued)

Other

California Title 24:

WPLED3T78/PCS2 complies with 2013 California Title 24 building and electrical codes as a commercial outdoor pole-mounted fixture > 30 Watts mounted at height greater than 24 feet. For mounting heights < 24 feet see WPLED3T78/BL with bi-level operation; additional component requirements will be listed in the Title 24 section under technical specifications on the product page.

Warranty:

RAB warrants that our LED products will be free from defects in materials and workmanship for a period of five (5) years from the date of delivery to the end user, including coverage of light output, color stability, driver performance and fixture finish.

Patents:

The WPLED design is protected by patents pending in the U.S., Canada, China, Taiwan and Mexico.

Buy American Act Compliance:

RAB values USA manufacturing! Upon request, RAB may be able to manufacture this product to be compliant with the Buy American Act (BAA). Please contact customer service to request a quote for the product to be made BAA compliant.

Dimensions

Features

High performance LED light engine
Maintains 70% of initial lumens at 100,000 hours
Weatherproof high temperature silicone gaskets
Superior heat sinking with die cast aluminum housing and external fins
Replaces 400W MH
100 up to 277 Volts
5-year warranty
## Ordering Matrix

<table>
<thead>
<tr>
<th>Family</th>
<th>Distribution</th>
<th>Watts</th>
<th>Color Temp</th>
<th>Mount</th>
<th>Finish</th>
<th>Voltage</th>
<th>Photocell</th>
<th>Dimming</th>
<th>Sensor</th>
<th>Bi-Level</th>
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<tr>
<td>2T</td>
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<td>5000K (Cool)</td>
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<td>4T</td>
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<td>Y = 3000K (Warm)</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>N = 4000K (Neutral)</td>
<td>Blank</td>
<td>Blank</td>
<td>Blank</td>
<td>Blank</td>
<td>Blank</td>
<td>/PCS</td>
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<tr>
<td></td>
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Note: Specifications are subject to change at any time without notice.
Lighting Material Manuals

Port Allen Harbor
HDOT Harbors, Highways, & Tunnels

JCI Contract: 4PX0-0031
<table>
<thead>
<tr>
<th>Part Name</th>
<th>Image</th>
<th>Additional Description</th>
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</thead>
<tbody>
<tr>
<td>ELWG0CXXGC</td>
<td><img src="image1.jpg" alt="Image" /></td>
<td>GE - LIGHTGRID GATEWAY</td>
</tr>
<tr>
<td>ELWK0A5</td>
<td><img src="image2.jpg" alt="Image" /></td>
<td>GE - LIGHTGRID NODE BOX ASSY 277V</td>
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<td>ELWM0CXV</td>
<td><img src="image3.jpg" alt="Image" /></td>
<td>GE - LIGHTGRID CELLULAR MODEM</td>
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<td>ELWN0A5</td>
<td><img src="image4.jpg" alt="Image" /></td>
<td>GE - LIGHTGRID NODE 277V</td>
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<td>RAB WPLED18NPC2</td>
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<td>RAB WPLED26NPC2</td>
<td><img src="image6.jpg" alt="Image" /></td>
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<td>Holo PMLED 06 4K-277V</td>
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<td>PMLED-06-4K-07A-AS-66-1-L-ZP PMLED FV-ZP</td>
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<tr>
<td>CREE PKG-304</td>
<td><img src="image9.jpg" alt="Image" /></td>
<td>PKG-304-PD-06-E-UL-SV-700-PML</td>
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# TABLE OF CONTENTS

## Catalog

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<td>Precision VTL-1X8-XL</td>
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<td>VTL-1X8-XL-F-UL-40K-C8</td>
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LightGrid™ Outdoor Wireless Control System

Description
LightGrid™ Outdoor Wireless Control System from GE allows remote monitoring and control, utility-grade energy measurement and GPS mapping of streetlights.

Product Features
- GPS module in every gateway
- Automatic gateway registration and display in MAP view
- Real-time update of the status of all the fixtures
- Self-forming & self-restoring mesh network
- Addressable via IPv6
- Nodes, gateway can be spaced up to 500m apart (Clear line of sight)
- Reliable and Secure Encrypted Communications

Applications
- Street Lighting
- Area Lighting

Product Specifications
- Input Voltage: 120-277V, 347V—480V
- Operating Temperature: -40 to +50C
- Surge: Meets ANSI C62.41 6KV, 3KA Combination Wave
- Power Consumption: < 3W
- Frequency: 915 MHz ISM Band
- GPS: Accuracy 3m (clear open sky)
- Addressing: IPv6
- Security: AES Encryption, Certificate Based
- Network Communication: IEEE 802.15.4, 6LoWPAN, 50 Channel FHSS
- Backhaul Communication: Ethernet or Cell (with modem)
- Complies with FCC Part 15 Required Sub Sections
- Complies with UL 916
- Weight: 7 lbs.
- Warranty: 3 years

Product Dimensions
Installation

**Gateway** will contain two ¾” liquid-tight conduit fittings, and three liquid-tight glands to accommodate customer installation flexibility according to the diagram below, which may require customer to cap or seal unused fittings during installation.

Packaging

- 1 Gateway Enclosure
- Conduit fittings (2 pcs mounted to enclosure)
- Gland fittings (3 pcs mounted to enclosure)
- GPS module and cable (1 pcs mounted to gland)
- Antenna Cable (1 pc mounted to gland)
- Antenna Pole (1 pc to be installed)
- Pole Mounting Bracket (2 pcs mounted to enclosure)

Ordering Number Logic

<table>
<thead>
<tr>
<th>E L W G</th>
<th>VOLTAGE (UL)</th>
<th>ANTENNA</th>
<th>COUNTRY/POLE</th>
<th>GPS</th>
<th>IP COMMUNICATION</th>
<th>NETWORK CONFIGURATION</th>
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<tr>
<td></td>
<td>D = 120/277</td>
<td>C = Standard 18&quot;</td>
<td>XX = Default (US)</td>
<td>G = GPS Capability</td>
<td>C = Cat 5 Cable Only</td>
<td>B = Network B None = Default</td>
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</table>

www.gelighting.com

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LightGrid™ Cell Modem
Outdoor Wireless Control System

Description
LightGrid™ Outdoor Wireless Control System from GE allows remote monitoring and control, utility-grade energy measurement and GPS mapping of streetlights.

Specifications
• Input Voltage: 120-277V, 347V—480V
• Weight: 8 lbs
• Dimensions: 15 in. x 13 in. x 7 in
• Mounting Height: 27 ft.–40 ft.
• Warranty: 3 years

Cell Based Network

Applications
• Street Lighting
• Area Lighting

Packaging
• Cellular enclosure (1pc)
• Conduit fitting (2pcs, mounted to enclosure)
• Flexible conduit (2pc)
• Power cable, stripped ends (1pc)
• Ethernet cable (1pc)
• Pole mounting bracket (2pcs, mounted to enclosure)

Ordering Number Logic

<table>
<thead>
<tr>
<th>PRODUCT ID</th>
<th>VOLTAGE</th>
<th>IP COMMUNICATION</th>
<th>FUTURE USE</th>
<th>PROVIDER</th>
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<tbody>
<tr>
<td>E L W M</td>
<td>O</td>
<td>C = CAT 5 Cable only</td>
<td>X</td>
<td>V = Verizon</td>
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<td></td>
<td>= 120-277</td>
<td></td>
<td></td>
<td>R = Rogers</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X = Future Use</td>
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</table>
Mounting Gateway and Cellular

Carefully unpack unit from its packaging. Properly inspect for defects before installing.

1. Before attaching gateway enclosure to pole, ensure the mount band clamps are correctly oriented. **NOTE:** Adjustable steel band allows mounting on pole diameters up to 15 inches.

2. Attach gateway enclosure to pole by tightening steel band clamps. Fold or trim excess metal band if needed.

3. Position cellular enclosure below the gateway enclosure and attach to pole by tightening both steel band clamps. **NOTE:** The distance (A) between the two enclosures should be adjusted to accommodate the length of the Ethernet cable and power in/out cable.

4. Install GPS and antenna into bracket and tighten bolt (45 lbs-in. torque).

5. Insert GPS and antenna wires through two glands in bottom of gateway enclosure.

6. Install two 0.75-inch diameter nonmetallic Type B liquid-tight conduit between gateway and cellular enclosures.
GE Lighting

LightGrid™ Node
Outdoor Wireless Control System

Description
LightGrid™ Outdoor Wireless Control System from GE allows remote monitoring and control, utility-grade energy measurement and GPS mapping of streetlights.

Product Features
- Utility Grade Measurement up to 0.5% Accuracy
- Self-forming & self-restoring mesh network
- Static IPV6 data addressing and routing
- Reliable and Secure Encrypted Communications
- Nodes, gateway can be spaced up to 500m apart (Clear Line of Sight)
- Utility grade 15 minute time of use Energy consumption reporting
- Full Autonomous Photocell Functionality (No wireless network required)
- Time Based Lighting schedules to maximize energy savings
- Integrated GPS in each node for Real time Asset Reporting
- Dynamic Lumen Output Level Control
- Real time measurement and storage of Voltage, Current, Wattage, Power Factor, and Hours of operation

Applications
- Street Lighting
- Area Lighting
Product Specifications

- Input Voltage: 120-277V, 347V and 480V
- Radio Frequency: 915 MHz ISM Band
- Network Communication: IEEE 802.15.4, 6LoWPAN, 50 Channel FHSS
- Addressing: IPv6
- Dimming: 0-10V
- Operating Temperature: -40 to +50C
- Surge: Meets ANSI C62.41 6KV, 3KA Combination Wave
- Power consumption i.e. <2W 120-277V, < 3W 347 and 480V
- Photocell: Complies with ANSI C136.10-2006
- GPS: Accuracy 3m (clear open sky)
- Security: AES Encryption and Certificate based authentication
- Utility Grade Energy Measurement: Complies with relevant sections of ANSI C12.20
- Complies with FCC Part 15 required sub sections
- Complies with UL 773, Wet Rated, Type 2 Outdoor
- Complies with ANSI C136.41-2013 (ANSI Dimming)
- Warranty: 5 yrs Standard. 10 yrs Extended Warranty Available

Product Dimensions

Ordering Number Logic

<table>
<thead>
<tr>
<th>E L W N</th>
<th>VOLTAGE</th>
<th>PIN CONFIGURATION</th>
<th>METERING</th>
<th>GPS</th>
<th>MAX WATTAGE</th>
<th>NETWORK CONFIGURATION</th>
<th>COUNTRY/POLE</th>
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<tbody>
<tr>
<td>E L W N</td>
<td>0 = 120/277</td>
<td>D = GE Dimming</td>
<td>R = 2% Revenue Grade</td>
<td>G = GPS Capability</td>
<td>5 = 450 Watts</td>
<td>S = Stand Alone</td>
<td>None = Default (US)</td>
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<tr>
<td></td>
<td>5 = 480</td>
<td>A = ANSI Dimming</td>
<td>U = 0.5% Utility Grade</td>
<td></td>
<td></td>
<td>B = Network B</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>S = 5 Pin</td>
<td></td>
<td></td>
<td></td>
<td>None = Default</td>
<td></td>
</tr>
</tbody>
</table>

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CTRL001 (Rev 06/10/15)
Thank you for buying RAB lighting fixtures. Our goal is to design the best quality products to get the job done right. We’d like to hear your comments.
Call the Marketing Department at 888-RAB-1000 or email: marketing@rabweb.com

IMPORTANT
READ CAREFULLY BEFORE INSTALLING FIXTURE. RETAIN THESE INSTRUCTIONS FOR FUTURE REFERENCE.
Fixtures must be wired in accordance with the National Electrical Code and all applicable local codes. Proper grounding is required for safety. THIS PRODUCT MUST BE INSTALLED IN ACCORDANCE WITH THE APPLICABLE INSTALLATION CODE BY A PERSON FAMILIAR WITH THE CONSTRUCTION AND OPERATION OF THE PRODUCT AND THE HAZARDS INVOLVED.
WARNING: Make certain power is OFF before installing or maintaining fixture. No user serviceable parts inside.
CAUTION: For proper weatherproof function all gaskets must be seated properly and all screws inserted and tightened firmly. Apply weatherproof silicone sealant around the edge of the Back Box and/or Junction Box. This is especially important with an uneven wall surface. Silicone all plugs and unused conduit entries.

JUNCTION BOX MOUNT FOR CONDUIT
For use on applications where conduit wiring is needed.
1. Loosen (4) Lens Screws and swing open Hinged Door.
   Screws will remain in place with O-Rings.
2. Loosen and remove (2) Housing Screws. Remove Housing from Back Box. Keep Housing Gasket intact for re-assembly.
3. Feed wires into Back Box through Silicone Wiring Plug, if not using conduit/ connectors.
4. Secure Back Box to the mounting surface using hardware appropriate for that mounting surface. Silicone around the edge of Back Box Gasket (self adhesive) and/or junction box.
5. Wire the fixture using UL listed wire connectors according to NEC and local codes. Apply sealant to all unused conduit entry points.
6. Place Gasket between Back Box and Housing. Re-mount Housing to Back Box. Check Housing Gasket seal all around the Back Box.
7. Re-mount Door to Housing. Tighten (4) Lens Screws. Check door gasket (not shown) seal.
8. Fixture is UL Listed for down and up lighting and may be mounted in either position. Fixture may not melt heavy snow accumulation in an upright position.

SURFACE MOUNT FOR RECESSED JUNCTION BOX
For use with recessed junction box and wiring.
1. Mount Surface Plate to fixture with (4) Surface Plate Screws. There are two screws from the front and two screws from the back. Make sure Housing Gasket makes complete seal all the way around.
2. Use supplied crossbar. Mount Crossbar to recessed junction box with (2) screws.
3. Place Junction Box Gasket on back of the fixture. Gasket should create seal against mounting surface.
4. Wire fixture to supply wires in recessed junction box according to wiring section.
5. Use 1/4 x 20 stainless steel Mounting Screw to attach fixture to Crossbar. Tighten Mounting Screw.
6. Cover screw with Cap, provided.
7. Fixture is UL Listed for down and up lighting and may be mounted in either position. Fixture may not melt heavy snow accumulation in an upright position.
**WPLED® 18W INSTALLATION INSTRUCTIONS**

Thank you for buying RAB lighting fixtures. Our goal is to design the best quality products to get the job done right. We’d like to hear your comments.

Call the Marketing Department at 888-RAB-1000 or email: marketing@rabweb.com

---

**JUNCTION BOX**

1. The Junction box has (4) conduit entry points on the center of each side and (1) in the center back.

2. **Mounting Points** are dimensioned below.

   ![Junction Box Diagram]

   - 4 3/4”
   - 2 3/16”
   - 3 1/2”
   - 1 1/8”

**CLEANING & MAINTENANCE**

**CAUTION:** Be sure fixture temperature is cool enough to touch. Do not clean or maintain while fixture is energized.

1. Clean glass lens with non-abrasive glass cleaning solution.

2. Do not open fixture to clean the LED. Do not touch the LED.

**ON-OFF WIRING**

Universal voltage driver permits operation at 100V to 277VAC, 50 or 60Hz except fixtures factory ordered with a 120V photocell (/PC) and 277V photocell (/PC2).

1. Connect the black fixture lead to the (+) LINE supply lead.

2. Connect the white fixture lead to the (-) COMMON supply lead.

3. Connect the bare copper Ground wire from fixture to supply ground.

**TROUBLESHOOTING**

1. Check that the line voltage at fixture is correct. Refer to wiring directions.

2. Is the fixture grounded properly?

3. Be sure the photocell, if used, is functioning properly.

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**TROUBLESHOOTING**

1. Check that the line voltage at fixture is correct. Refer to wiring directions.

2. Is the fixture grounded properly?

3. Be sure the photocell, if used, is functioning properly.

**PATENTS:** **US:** pat. D634,878, **CN:** ZL201030679778.2

---

**WPLED18 Cool**

<table>
<thead>
<tr>
<th>Light Output (Lumens)</th>
<th>2044</th>
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<tr>
<td>Watts</td>
<td>19.8</td>
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<tr>
<td>Lumens per Watt (Efficacy)</td>
<td>103</td>
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**Color Accuracy (Color Rendering Index (CRI))**

- Warm White | 66 |
- Bright White | 66 |
- Daylight | 66 |

**Light Color (Color Temperature (K))**

- Warm White | 3000K |
- Bright White | 4000K |
- Daylight | 5000K |

**WPLED18N Neutral**

<table>
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<th>Light Output (Lumens)</th>
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<tr>
<td>Watts</td>
<td>19.8</td>
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<tr>
<td>Lumens per Watt (Efficacy)</td>
<td>83</td>
</tr>
</tbody>
</table>

**Color Accuracy (Color Rendering Index (CRI))**

- Warm White | 84 |
- Bright White | 84 |
- Daylight | 84 |

**Light Color (Color Temperature (K))**

- Warm White | 3000K |
- Bright White | 4000K |
- Daylight | 5000K |

**WPLED18Y Warm**

<table>
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<th>Light Output (Lumens)</th>
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<tbody>
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<td>Watts</td>
<td>20</td>
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<tr>
<td>Lumens per Watt (Efficacy)</td>
<td>81</td>
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</table>

**Color Accuracy (Color Rendering Index (CRI))**

- Warm White | 83 |
- Bright White | 83 |
- Daylight | 83 |

**Light Color (Color Temperature (K))**

- Warm White | 3000K |
- Bright White | 4000K |
- Daylight | 5000K |

---

**Easy Installation & Product Help**

**Tech Help Line**
Call our experts 888 RAB-1000

**rabweb.com**
Visit our website for product info

**email**
Answered promptly sales@rabweb.com
LED 26W Wallpacks. Patent Pending thermal management system. 100,000 hour L70 lifespan. 5 Year Warranty.

Color: Bronze  Weight: 7.5 lbs

<table>
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<tr>
<th>Technical Specifications</th>
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<tr>
<td><strong>Other</strong></td>
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<td>WPLED26 with Photocell:</td>
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<tr>
<td>277V Button Photocell Included. Photocell is compatible with 208V-277V.</td>
</tr>
<tr>
<td><strong>California Title 24:</strong></td>
</tr>
<tr>
<td>WPLED26/PC2 complies with 2013 California Title 24 building and electrical codes as a commercial outdoor non-pole-mounted fixture &lt; 30 Watts.</td>
</tr>
<tr>
<td><strong>Equivalency:</strong></td>
</tr>
<tr>
<td>The WPLED26 is Equivalent in delivered lumens to a 175W Metal Halide Wallpack.</td>
</tr>
<tr>
<td><strong>HID Replacement Range:</strong></td>
</tr>
<tr>
<td>The WPLED26 can be used to replace 150 - 200W Metal Halide Wallpacks based on delivered lumens.</td>
</tr>
<tr>
<td><strong>Patents:</strong></td>
</tr>
<tr>
<td>The WPLED design is protected by U.S. Pat. 6634678, Canada Pat 134878, China Pat. CN301649064S.</td>
</tr>
<tr>
<td><strong>Country of Origin:</strong></td>
</tr>
<tr>
<td>Designed by RAB in New Jersey and assembled in the USA by RAB's IBEW Local 3 workers.</td>
</tr>
<tr>
<td><strong>Buy American Act Compliant:</strong></td>
</tr>
<tr>
<td>This product is a COTS item manufactured in the United States, and is compliant with the Buy American Act.</td>
</tr>
<tr>
<td><strong>Recovery Act (ARRA) Compliant:</strong></td>
</tr>
<tr>
<td>This product complies with the 52.225-21 &quot;Required Use of American Iron, Steel, and Manufactured Goods-- Buy American Act-- Construction Materials (October 2010).</td>
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<tr>
<td><strong>Trade Agreements Act Compliant:</strong></td>
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<td>This product is a COTS item manufactured in the United States, and is compliant with the Trade Agreements Act.</td>
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<table>
<thead>
<tr>
<th>Driver Info</th>
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<tr>
<td><strong>Type:</strong></td>
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<tr>
<td>Constant Current</td>
</tr>
<tr>
<td><strong>120V:</strong></td>
</tr>
<tr>
<td>N/A</td>
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<tr>
<td><strong>208V:</strong></td>
</tr>
<tr>
<td>0.16A</td>
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<tr>
<td><strong>240V:</strong></td>
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<tr>
<td>0.14A</td>
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<tr>
<td><strong>277V:</strong></td>
</tr>
<tr>
<td>0.12A</td>
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<tr>
<td><strong>Input Watts:</strong></td>
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<tr>
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<td>88%</td>
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<table>
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<tr>
<td>26W</td>
</tr>
<tr>
<td><strong>Color Temp:</strong></td>
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<tr>
<td>4000K (Neutral)</td>
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<tr>
<td><strong>Color Accuracy:</strong></td>
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<tr>
<td>83 CRI</td>
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<tr>
<td><strong>L70 Lifespan:</strong></td>
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<tr>
<td><strong>Lumens:</strong></td>
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<tr>
<td>2,415</td>
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<tr>
<td><strong>Efficacy:</strong></td>
</tr>
<tr>
<td>81 LPW</td>
</tr>
</tbody>
</table>

**Finish:**
Our environmentally friendly polyester powder coatings are formulated for high-durability and long-lasting color, and contains no VOC or toxic heavy metals.

**Ambient Temperature:**
Suitable for use in 40°C ambient temperatures.

**Cold Weather Starting:**
The minimum starting temperature is -40°F/-40°C.

**Thermal Management:**
Cast aluminum Thermal Management system for optimal heat sinking. The LPACK is designed for cool operation, most efficient output and maximum LED life by minimizing LED junction temperature.

**Green Technology:**
RAB LEDs are Mercury, Arsenic and UV free.

**For use on LEED Buildings:**
IDA Dark Sky Approval means that this fixture can be used to achieve LEED Credits for Light Pollution Reduction.

**Electrical**

**Driver:**
Multi-chip 26W high output long life LED Driver Constant Current, 720mA, Class 2, 6kV Surge Protection, 100V-277V, 50-60 Hz, 100-240V.4 Amps.

**THD:**
8.4% at 120V, 10.7% at 277V

**GSA Schedule:**
Suitable in accordance with FAR Subpart 25.4.

**UL LISTING:**
Suitable for wet locations. Suitable for mounting within 1.2m (4ft) of the ground.

**DLC Listed:**
This product is on the Design Lights Consortium (DLC) Qualified Products List and is eligible for rebates from DLC Member Utilities.

**Dark Sky Approved:**
The International Dark Sky Association has approved this product as a full cutoff, fully shielded luminaire.

**LED Characteristics**

**Lifespan:**
100,000-hour LED lifespan based on IES LM-80 results and TM-21 calculations.

**Color Consistency:**
3-step MacAdam Ellipse binning to achieve consistent fixture-to-fixture color.

**Color Stability:**
LED color temperature is warranted to shift no more than 200K in CCT over a 5 year period.

**Color Uniformity:**

**Construction**

**IP Rating:**
Ingress Protection rating of IP66 for dust and water.
Technical Specifications (continued)

Optical

BUG Rating:
B1 U0 G0

Dimensions

Features

- High performance LED light engine
- Maintains 70% of initial lumens at 100,000 hours
- Weatherproof high temperature silicone gaskets
- Superior heat sinking with die cast aluminum housing and external fins
- 100 up to 277 Volts
- 5-year warranty

Ordering Matrix

<table>
<thead>
<tr>
<th>Family</th>
<th>Watts</th>
<th>Color Temp</th>
<th>Sensor</th>
<th>Surface Plate</th>
<th>Finish</th>
<th>Photocell</th>
<th>Dimming</th>
</tr>
</thead>
<tbody>
<tr>
<td>WPLED</td>
<td>26 = 26W</td>
<td>= Cool</td>
<td>= No Sensor</td>
<td>= No Surface Plate</td>
<td>= Bronze</td>
<td>= No Photocell</td>
<td>= No Dimming</td>
</tr>
<tr>
<td></td>
<td>Y = Warm</td>
<td>MS = Mini Sensor</td>
<td>S = Surface Plate</td>
<td>W = White</td>
<td>/PC = 120V Button</td>
<td>/PCS = 120V Swivel</td>
<td>/PC2 = 277V Button</td>
</tr>
<tr>
<td></td>
<td>N = Neutral</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Specifications are subject to change at any time without notice
Optical
Performance of the PMLED is to replace 400-1,000 watt MH luminaires. Performance of the PLLED is to replace 750-1000 watt HID product. The optical system utilizes state-of-the-art COB (chip-on-board) technology with 3000K, 4000K and 5000K color temperature choices and a 70 CRI minimum color temperature. The luminaire uses a highly specular internal reflector designed for superior field to beam ratios, uniformity and spacing. NEMA beam pattern choices of 4X4, 4X5, 5X5, 6X5, and 6X6 are available. Optional shielding is available to control uplight and light trespass. The optical enclosure is a borosilicate prismatic glass lens.

Electrical
Long Life: LED light engines are rated > 100,000 hours at 25C, L70. Electronic driver has a rated life of 100,000 hour at a 25C ambient. Surge protection device provides IEEE/ANSIc62.4 Category C (10kV/5kA) level of protection.

Mechanical
Rugged low copper A360 alloy die-cast aluminum housing has integral heat sink fins to optimize thermal management through conductive and convection cooling. The housings are painted with a super durable polyester paint finish over an epoxy primer pretreat yielding a finish that achieves a scribe creepage of 8 after 5,000 hours exposure to salt spray, providing durability and corrosion resistance.

The luminaire is available in either knuckle mount or yoke mount. The knuckle mount is adjustable and is designed to fit 2.375 inch to 2.875 inch tenons. The yoke mount is available in either galvanized steel or stainless steel. The luminaire comes standard prewired eliminating the need for opening the unit during installation. The knuckle version is pre-wired to the wiring chamber at the fitter.

The yoke mount has provision for a pre-wired cord drop to specified length in the ordering information. The luminaire comes standard with the door frame bolted to the housing. Optional tool-less stainless steel latches are available to allow easy access to LED drivers, surge protection, and terminal block. The optical enclosure is sealed and gasketed to an IP66 rating.

Controls
The NEMA three pin locking-style photocontrol receptacle and an optional five pin receptacle is available. Dimming version uses proprietary Acuity Brands components to enable continuous 0-10V dimming down to 10% output via the ROAM smart controls system (optional). Photocontrol for solid-state lighting meets ANSI C136.10 criteria

Warranty & Standards
Rated for -40C to 35C ambient
UL 1598 A wet location, UL 1598A Marine
The Predator LED is a direct replacement for installed high intensity discharge (HID) flood lights. The chart below gives general guidance on replacement of the Predator LED to HID luminaires.

## Operating Characteristics

The Predator LED is a direct replacement for installed high intensity discharge (HID) flood lights. The chart below gives general guidance on replacement of the Predator LED to HID luminaires.

<table>
<thead>
<tr>
<th>Replacement</th>
<th>HID Wattage CWA Type</th>
<th>Modules</th>
<th>Lumens</th>
<th>LED Wattage</th>
<th>LPW</th>
<th>Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLLEd 1000 HPS</td>
<td>1100</td>
<td>9 COB/10A</td>
<td>48,000</td>
<td>391</td>
<td>123</td>
<td>64%</td>
</tr>
<tr>
<td>PMLEd 1000 MH</td>
<td>1070</td>
<td>6 COB/10A</td>
<td>32,000</td>
<td>261</td>
<td>123</td>
<td>75%</td>
</tr>
<tr>
<td>PMLEd 750 MH</td>
<td>820</td>
<td>6 COB/10A</td>
<td>32,000</td>
<td>261</td>
<td>123</td>
<td>68%</td>
</tr>
<tr>
<td>PMLEd 400 HPS</td>
<td>464</td>
<td>4 COB/10A</td>
<td>22,000</td>
<td>177</td>
<td>123</td>
<td>61%</td>
</tr>
</tbody>
</table>
**SPECIFICATIONS**

**Features**
- This handy wrap is an excellent choice for hallways, closets, utility rooms, back-of-house locations and low ceiling areas.
- Diffuser features flat bottom, vertical sides and interior overlay providing uniformity without pixilation.
- Surface mount or stem suspended.
- Choice of two lumen packages and dimming option available.
- Long-life, LEDs at L70 (70% lumen maintenance) at 50,000 hours to reduce life cycle maintenance costs.
- Optional emergency battery backup for safety lighting.
- Available in 2’ and 4’ lengths.
- Up to 100 lumens per watt.
- Color Rendering Index (CRI) > 80.

**Construction**
- Heavy gauge steel housing, die embossed for maximum rigidity
- Prismatic acrylic diffuser with overlay hinges from either side
- Certain airborne contaminants can diminish integrity of acrylic.
  - Contact factory for chemical compatibility.
- LED boards and driver accessible for future maintenance or upgrades
- Weight: 1x2 - 5 lbs. 1x4 - 10 lbs.

**Electrical**
- Input Voltage Range: 120-277 VAC Nom.
- Frequency: 50/60 Hz Nom.
- Active Power Factor Correction
- Power Factor: >0.90 @ full load, 120V through 277V
- Harmonic Distortion: THD < 20% @ full load
- Protection: Over-Voltage, Over-Temperature (110º) & Short Circuit
- Compliant to FCC Part 15 requirements for EMI/RFI emissions

**Certifications**
- CSA listed for Canada and U.S. Tested to UL 1598 & UL 8750 standards.
- Luminaires bear appropriate listing labels.
- Emergency-equipped fixtures labeled UL 924.
- Adheres to LM79, LM80 and TM21 industry standards.
- DesignLights Consortium® (DLC) qualified.
- Please refer to the DLC website for specific product qualifications at www.designlights.org.

**Application**
- Suitable for use with most wired or wireless lighting control systems
- Suitable for dry & damp locations:
  - Government buildings
  - Commercial areas
  - Task lighting
  - Retail
  - Schools
  - Hallways
  - Closets

**Warranty**
- Five-year warranty. (Terms and Conditions Apply)

**ORDERING INFORMATION**

```
LLW-4-40-XL-F-UL-40K
```

**FOOTNOTES**
1. Bi-Level driver must be controlled by sensor or A/B switching.
2. Must be used in conjunction with lighting controls.
3. Only available in 4 ft.
## PHOTOMETRIC DATA

### PHOTOMETRIC DATA: LLW2-40LW-EU

All published luminaire photometric testing performed to IESNA LM-79-08 standards by a NVLAP certified lab.

#### LUMINAIRES DATA

**Luminaire**
LLW2-40LW-EU LED Low Profile Wrap

**Ballast**
D150CQ25UNVA-A

**Ballast Factor**
1.00

**Lamp**
LED

**Fixture Lumens**
2455

**Watts**
25

**Mounting**
Surface

**Shading Angle**
N.A.

**Spacing Criterion**
0° = 1.19 90° = 1.09

**Luminous Opening in feet**
Length: 1.99  Width: 0.67  Height: 0.14

#### COEFFICIENTS OF UTILIZATION (%)

<table>
<thead>
<tr>
<th>RC</th>
<th>RW</th>
<th>80</th>
<th>70</th>
<th>50</th>
<th>30</th>
<th>10</th>
<th>0</th>
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</thead>
<tbody>
<tr>
<td>0</td>
<td>109</td>
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<td>96</td>
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<td>92</td>
<td>85</td>
<td>80</td>
<td>89</td>
<td>83</td>
<td>79</td>
</tr>
<tr>
<td>2</td>
<td>81</td>
<td>74</td>
<td>68</td>
<td>68</td>
<td>68</td>
<td>63</td>
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<td>15</td>
<td>13</td>
<td>13</td>
<td>13</td>
<td>10</td>
<td>8</td>
</tr>
</tbody>
</table>

#### ZONAL LUMEN SUMMARY

<table>
<thead>
<tr>
<th>Zone</th>
<th>Lumens</th>
<th>%Lamp</th>
<th>%Fixt</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-30</td>
<td>808</td>
<td>33</td>
<td>33</td>
</tr>
<tr>
<td>0-40</td>
<td>1262</td>
<td>51</td>
<td>51</td>
</tr>
<tr>
<td>0-50</td>
<td>1931</td>
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<tr>
<td>0-60</td>
<td>2289</td>
<td>93</td>
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#### INDOOR CANDELA PLOT

[Diagram of Indoor Candela Plot]

### PHOTOMETRIC DATA: LLW4-35ML-EU

All published luminaire photometric testing performed to IESNA LM-79-08 standards by a NVLAP certified lab.

#### LUMINAIRES DATA

**Luminaire**
LLW4-35ML-EU LED Low Profile Wrap

**Ballast**
D310CQ50UNVA-A

**Ballast Factor**
1.00

**Lamp**
LED

**Fixture Lumens**
4693

**Watts**
52

**Mounting**
Surface

**Shading Angle**
0° = 90  90° = 90

**Spacing Criterion**
0° = 1.19  90° = 1.10

**Luminous Opening in feet**
Length: 3.99  Width: 0.67  Height: 0.14

#### COEFFICIENTS OF UTILIZATION (%)

<table>
<thead>
<tr>
<th>RC</th>
<th>RW</th>
<th>80</th>
<th>70</th>
<th>50</th>
<th>30</th>
<th>10</th>
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<tr>
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<td>114</td>
<td>114</td>
<td>107</td>
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<tr>
<td>1</td>
<td>99</td>
<td>92</td>
<td>85</td>
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<td>89</td>
<td>83</td>
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<td>10</td>
<td>8</td>
</tr>
</tbody>
</table>

#### ZONAL LUMEN SUMMARY

<table>
<thead>
<tr>
<th>Zone</th>
<th>Lumens</th>
<th>%Lamp</th>
<th>%Fixt</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-30</td>
<td>1538</td>
<td>33</td>
<td>33</td>
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<td>0-40</td>
<td>2414</td>
<td>51</td>
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<tr>
<td>0-50</td>
<td>3690</td>
<td>79</td>
<td>79</td>
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<tr>
<td>0-60</td>
<td>4359</td>
<td>93</td>
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</table>

#### INDOOR CANDELA PLOT

[Diagram of Indoor Candela Plot]
FIXTURE DIMENSIONS

CROSS SECTION

TOP VIEW

*Drawings N.T.S.

LUMEN PACKAGE OPTIONS

<table>
<thead>
<tr>
<th>Proposed System</th>
<th>CRI</th>
<th>CCT</th>
<th>Lumens Per Fixture</th>
<th>Input Watts</th>
<th>Lumens Per Watt</th>
<th>CCT</th>
<th>Lumens Per Fixture</th>
<th>Input Watts</th>
<th>Lumens Per Watt</th>
</tr>
</thead>
<tbody>
<tr>
<td>LLW2-LW &gt;80</td>
<td>3500K</td>
<td>2352</td>
<td>25</td>
<td>96</td>
<td>4000K</td>
<td>2452</td>
<td>25</td>
<td>98</td>
<td></td>
</tr>
<tr>
<td>LLW2-ML &gt;80</td>
<td>3500K</td>
<td>4648</td>
<td>51</td>
<td>91</td>
<td>4000K</td>
<td>4739</td>
<td>52</td>
<td>91</td>
<td></td>
</tr>
<tr>
<td>LLW4-LW &gt;80</td>
<td>3500K</td>
<td>2409</td>
<td>25</td>
<td>98</td>
<td>4000K</td>
<td>2459</td>
<td>25</td>
<td>98</td>
<td></td>
</tr>
<tr>
<td>LLW4-ML &gt;80</td>
<td>3500K</td>
<td>4689</td>
<td>52</td>
<td>98</td>
<td>4000K</td>
<td>4873</td>
<td>52</td>
<td>94</td>
<td></td>
</tr>
</tbody>
</table>

*Lumen values shown are initial delivered lumens tested at 25°C per IES LM-79 standards.

OPERATING ENVIRONMENT

<table>
<thead>
<tr>
<th>Proposed System</th>
<th>Min Temp</th>
<th>Max Temp</th>
<th>Application Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>LLW2-LW</td>
<td>-30°C/-22°F</td>
<td>40°C/104°F</td>
<td>1. Application temperatures are provided to ensure the longevity and performance of the driver and LEDs.</td>
</tr>
<tr>
<td>LLW2-ML</td>
<td>-30°C/-22°F</td>
<td>40°C/104°F</td>
<td>2. Results are based off the In-Situ Temperature Measurement Test (ISTMT) along with the drivers' temperature and life curves.</td>
</tr>
<tr>
<td>LLW4-LW</td>
<td>-30°C/-22°F</td>
<td>40°C/104°F</td>
<td>3. Optional emergency battery equipped units have a minimum temperature of 10°C.</td>
</tr>
<tr>
<td>LLW4-ML</td>
<td>-30°C/-22°F</td>
<td>40°C/104°F</td>
<td>4. Precision-Paragon [P2]'s 5 year warranty assumes operation at the maximum ambient temperature range.</td>
</tr>
</tbody>
</table>
PKG-304-SL-DM
304 Series™ Parking Structure Luminaire – Sparkle Petroleum – Direct Mount

Product Description
Slim, low profile design. Luminaire is constructed from rugged die cast and extruded aluminum components. LED driver is mounted in a sealed weather tight center chamber that allows for access from below the luminaire. High performance aluminum heat sinks specifically designed for LED parking structure application. Mounting brackets designed to mount directly over existing single gang and octagonal junction boxes for direct mount.

Performance Summary
Utilizes BetaLED® Technology
Patented NanoOptic® Product Technology
Made in the U.S.A. of U.S. and imported parts
CRI: Minimum 70 CRI
CCT: 5700K (+ / - 500K) Standard, 4000K (+ / - 300K)

Limited Warranty*: 10 years on luminaire / 10 years on Colorfast DeltaGuard® finish

Ordering Information
Example: PKG-304-SL-DM-04-E-UL-SV-350-OPTIONS

<table>
<thead>
<tr>
<th>Product</th>
<th>Optic</th>
<th>Mounting</th>
<th>LED Count (x10)</th>
<th>Series</th>
<th>Voltage</th>
<th>Color Options</th>
<th>Drive Current</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>PKG-304</td>
<td>SL Sparkle Petroleum</td>
<td>DM Direct Mount</td>
<td>04 06 E</td>
<td>UL Universal 120-277V</td>
<td>SV Silver (Standard)</td>
<td>700 700mA (Standard)</td>
<td>40K 4000K Color Temperature</td>
<td>0-10V Dimming</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Control by others</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Refer to dimming spec sheet for availability and additional information</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Can’t exceed specified drive current</td>
</tr>
</tbody>
</table>

F Fuse:
- When code dictates fusing use time delay fuse
- Not available with all multi-level options. Refer to multi-level spec sheet for availability and additional information

ML Multi-Level:
- Refer to multi-level spec sheet for availability and additional information

J Alternate Junction Box mounting

* See www.cree.com/lighting/products/warranty for warranty terms

Rev. Date: 06/25/13
Product Specifications

CONSTRUCTION & MATERIALS
- Slim, low profile design
- Constructed from rugged die cast and extruded aluminum components
- LED driver is mounted in a sealed weathertight center chamber that allows for access from below the luminaire
- High performance heat sinks specifically designed for LED parking structure application
- Mounting bracket is designed to mount directly over existing single gang and octagonal junction boxes for direct mount
- Exclusive Colorfast DeltaGuard® finish features an E-Coat epoxy primer with an ultra-durable powder topcoat, providing excellent resistance to corrosion, ultraviolet degradation and abrasion. Standard is silver. Bronze, black, white, and platinum bronze are also available

ELECTRICAL SYSTEM
- Input Voltage: 120–277V or 347–480V, 50 / 60Hz, Class 1 drivers
- Power Factor: > 0.9 at full load
- Total Harmonic Distortion: < 20% at full load
- Integral 10kV surge suppression protection standard
- To address inrush current, slow blow fuse or type C / D breaker should be used

REGULATORY & VOLUNTARY QUALIFICATIONS
- cULus Listed
- Suitable for wet locations
- Enclosure rated IP66 per IEC 60529
- Consult factory for CE Certified products
- 10kV surge suppression protection tested in accordance with IEEE / ANSI C62.412
- Luminaire and finish endurance tested to withstand 5,000 hours of elevated ambient salt fog conditions as defined in ASTM Standard B 117
- Pending product qualification on the DesignLights Consortium (“DLC”) Qualified Products List (“QPL”)
- RoHS Compliant
- Meets Buy American requirements within ARRA

Photometry
All published luminaire photometric testing performed to IESNA LM-79-08 standards by a NVLAP certified laboratory.

IES Files
To obtain an IES file specific to your project consult:

Lumen Output, Electrical, and Lumen Maintenance Data

<table>
<thead>
<tr>
<th>Sparkle Petroleum Distribution</th>
<th>50K Hours Projected Lumen Maintenance Factor*** @ 15˚C (59˚F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>350mA @ 25˚C (77˚F)</td>
<td>94%</td>
</tr>
<tr>
<td>525mA @ 25˚C (77˚F)</td>
<td>93%</td>
</tr>
<tr>
<td>700mA @ 25˚C (77˚F)</td>
<td>91%</td>
</tr>
</tbody>
</table>

* Actual production yield may vary between -4 and +10% of initial delivered lumens.
*** For recommended lumen maintenance factor data see TD-13. Calculated L70 based on 6,000 hours LM-80-08 testing > 150,000 hours.

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www.cree.com/lighting  T (800) 236-6800  F (262) 504-5415
VTL - LED Vaportight

- **Same Classic Housing, New Technology**
  - The VTL uses the latest in solid state technology
  - Proven IP65 rated housing platform
  - Efficacy between 97 and 101 Lumens/Watt depending on model
  - Reported L70 over 51,000 Hours Calculated at 65,000 hours via TM-21

- **Suitable for a variety of applications**
  - Outdoor Canopies...
  - Wet Locations...
  - Parking Garages
  - Industrial Areas...
  - Commercial Areas...

- **Why P2? With 18 CLMC’s our staff has the expertise you need to make your project a success.**
  - Lean on our industry experts to provide you with application support and help to specify the right product for your project.
  - We’ve assembled our team from all areas of the lighting industry; from installation, project and energy management to manufacturing and distribution. If you have a challenge, chances are we’ve been there too and can guide you to a solution.

### VTL - 1x8 - ML - BL - UL - 40K - C8 - WH - LSP

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<th>1x8</th>
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<th>C8</th>
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<th>LSP</th>
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<td>Driver Output</td>
<td>Voltage</td>
<td>Color Temp.</td>
<td>Cord Plug</td>
<td>Occ Sensor</td>
<td>Other</td>
</tr>
</tbody>
</table>

**Fixture Series**
- VTL = LED Vaportight

**Fixture Size**
- 1x4 = 1x4 Nominal
- 1x8 = 1x8 Nominal

**Lumen Output**
- XL = Extra Low Wattage, 31W
- LW = Low Wattage, High Efficiency, 51W
- ML = Medium Lumen Output, 74W
- HL = High Lumen Output, 96W

**Notes**
1. Must be ordered in conjunction with lighting controls. Contact factory for assistance.
2. Bi-Level driver must be controlled by sensor or A/B switching
3. Bracket standard with all fixtures.

**Driver Output**
- F = Fixed Output
- DM = 0-10V Dimming (1)
- BL = Bi-Level (2)

**Voltage**
- UL = Universal 120-277

**Color Temperature**
- 40K = 4000K
- 50K = 5000K

**Cord & Plug**
- C8 = 8’ Cord, No Plug
- C8/L715 = 8’ Cord & Plug (L7-15P)
- PQ15 = 15’ Cord/Quick Connect

**Occupancy Sensor**
- WH = Wet Location 360 View
- Hi-Bay Sensor
- WL = Wet Location 360 View
- Lo-Bay Sensor

**Other Options**
- VSB = VTL Surface/Hanging Bracket (3)
- VAB = VTL Angled Bracket
- SSL = Stainless Steel Latches
- LSP = Lighting Surge Protector (270 Joules)

- 5 YR Warranty
- RoHS
- 40°C Max
- -40°C Min
- Damp Location
- DLC Pending
- Lighting Facts Pending
VTL - LED Vaportight

Fixture Construction
- Impact Resistant Fiberglass housing.
- Aluminum Gear Tray
- Frosted Linear Ribbed Diffuser
- Poured in place gasket.
- Class 2 Driver

VTL Mounted to 45° Mounting Brackets
- VTL Eye-Bolt Mounting with 45° Bracket (Order Separately)

Want Fluorescent?
Consider our fluorescent VTG with long life lamps and PS ballast.

Existing System

<table>
<thead>
<tr>
<th>Existing Lamp / Ballast System</th>
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<th>Mean Lumens Per Fixture</th>
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</thead>
<tbody>
<tr>
<td>2L40-T12 Mag</td>
<td>2 F40/T12/WM</td>
<td>2,780</td>
<td>4,560</td>
<td>0.68</td>
<td>0.75</td>
<td>2,800</td>
<td>72</td>
<td>42</td>
</tr>
<tr>
<td>1L96-T12 Mag</td>
<td>1 F96/T12/ES</td>
<td>4,750</td>
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</tr>
<tr>
<td>1L96-T12HO Mag</td>
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<td>2 F32T8/841</td>
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<td>73</td>
<td>66</td>
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</tbody>
</table>

Re-Lighting Options

<table>
<thead>
<tr>
<th>Proposed System</th>
<th>Light Source Quantity &amp; Type</th>
<th>CRI</th>
<th>CCT</th>
<th>Driver Factor</th>
<th>Approx. Fixture Efficiency</th>
<th>Delivered Lumens Per Fixture</th>
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</tr>
</thead>
<tbody>
<tr>
<td>VTL-1X4-XL</td>
<td>1 1X4 XL Engine</td>
<td>&gt;80</td>
<td>400K</td>
<td>1.00</td>
<td>1.00</td>
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</tr>
<tr>
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<td>1 1X4 LW Engine</td>
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</tr>
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<td>VTL-1X4-ML</td>
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HDOT Phase 1

LIH – Lihue Airport
Solar Lighting Upgrades

Materials Cut Sheets

Prepared by

Johnson Controls Lighting Services
<table>
<thead>
<tr>
<th>PART NUMBER</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATB2 40BLEDE70 120 R2 GY NR DCDRIVER &amp; EG-340</td>
<td>Holophane Roadway LED luminaire, 120 volts, gray, Type II optics, 40B chips; w/ EG-340 Off Grid Solar LED</td>
</tr>
<tr>
<td>ATB2 40BLEDE70 120 R4 GY NR DCDRIVER &amp; EG-340</td>
<td>Holophane Roadway LED luminaire, 120 volts, gray, Type IV optics, 40B chips; w/ EG-340 Off Grid Solar LED</td>
</tr>
<tr>
<td>ATB2 40BLEDE70 120 R5 GY NR DCDRIVER &amp; EG-340</td>
<td>Holophane Roadway LED luminaire, 120 volts, gray, Type V optics, 40B chips; w/ EG-340 Off Grid Solar LED</td>
</tr>
</tbody>
</table>
Autobahn Series ATB2
Roadway Lighting

PRODUCT OVERVIEW

Applications:
Roadways
Off ramps
Residential streets
Parking lots

Features:

OPTICAL
Same Light: Performance is comparable to 200-400W HPS roadway luminaires.
White Light: Correlated color temperature - standard 4000K, 70 CRI minimum or optional 5000K, 65 CRI minimum.
Unique IP66 rated LED light engines provided 0% uplight and restrict backlight to within sidewalk depth, providing optimal application coverage and optimal pole spacing.
Available in Type II, III, IV, & V roadway distributions.

ELECTRICAL
Expected Life: LED light engines are rated >100,000 hours at 25°C, L70.
Electronic driver has an expected life of 100,000 hours at a 20°C ambient.
Lower Energy: Saves an average of 40-50% over comparable HPS platforms.
Robust Surge Protection: Acuity’s proprietary SPD provides IEEE/ANSI C62.41 Category C (10kV/5kA) level of protection.

MECHANICAL
Easy to Maintain: Includes standard AEL lineman-friendly features such as tool-less entry, tool-less NEMA photocontrol receptacle, terminal block and quick disconnects. Bubble level located inside the electrical compartment for easy leveling at installation.
Rugged die-cast aluminum housing is polyester powder-coated for durability and corrosion resistance. Rigorous five-stage pre-treating and painting process yields a finish that achieves a scribe creepage rating of 8 (per ASTM D1654) after over 1000 hours exposure to salt fog chamber (operated per ASTM B117) Optional Enhanced Corrosion Resistant finish (CR) increases the salt spray exposure to 5000 hours.
Four-bolt mast arm mount is adjustable for arms from 1-1/4” to 2” (1-5/8” to 2-3/8” O.D.) diameter and provides a 3G vibration rating per ANSI C136.
Wildlife shield is cast into the housing (not a separate piece).
Die-cast trigger latch on doorframe allows for tool-less entry and enables easy and secure opening with one hand.

CONTROLS
NEMA photocontrol receptacle is standard; tool-less “lift and turn” receptacle.
Dimming version (available with DE and VE option) uses proprietary Acuity Brands components to enable continuous 0-10V dimming down to 10% output via the ROAM® smart controls system (sold separately).
Photocontrol for solid-state lighting (available with PCSS option) meets ANSI C136.10 criteria.

WARRANTY & STANDARDS
5 year limited warranty. Full warranty terms located at http://www.acuitybrands.com/Libraries/Terms_and_Conds/ABL_LED_Commerical_Outdoor.sflb.ashx
Rated for -40°C to 40°C ambient.
CSA Certified to U.S. and Canadian standards
Complies with ANSI: C136.2, C136.10, C136.14, C136.31, C136.15, C136.37

Note: Specifications subject to change without notice. Actual performance may differ as a result of end-user environment and application.
## Autobahn Series ATB2

### Roadway Lighting

#### ORDERING INFORMATION

Example: \textit{ATB2 40BLEDE70 MVOLT R2}

<table>
<thead>
<tr>
<th>Series</th>
<th>Performance Packages</th>
<th>Voltage</th>
<th>Optics</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATB2</td>
<td>40BLEDE53 40B Chips, 525 mA Driver</td>
<td>120 120V MVOLT</td>
<td>R2 Roadway Type II</td>
</tr>
<tr>
<td></td>
<td>40BLEDE70 40B Chips, 700 mA Driver</td>
<td>Multi-volt, 120-277V</td>
<td>R3 Roadway Type III</td>
</tr>
<tr>
<td></td>
<td>40BLEDE10 40B Chips, 1000 mA Driver</td>
<td>347 347V</td>
<td>R4 Roadway Type IV</td>
</tr>
<tr>
<td></td>
<td>60BLEDE53 60B Chips, 525 mA Driver</td>
<td>480 480V</td>
<td>R5 Roadway Type V</td>
</tr>
<tr>
<td></td>
<td>60BLEDE70 60B Chips, 700 mA Driver</td>
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<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Color Temperature (CCT)</th>
<th>Options</th>
<th>Controls</th>
</tr>
</thead>
<tbody>
<tr>
<td>(blank) 4000K (standard)</td>
<td>Misc.</td>
<td>NEMA Photocontrol Receptacle (standard)</td>
</tr>
<tr>
<td>5K 5000K</td>
<td>HS House-Side Shield</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BL External Bubble</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CR Enhanced Corrosion Resistant Finish</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mounting</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>(blank) 4-bolt Internal (standard)</td>
<td>NL Nema Label</td>
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<table>
<thead>
<tr>
<th>Paint</th>
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</tr>
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<tbody>
<tr>
<td>(blank) Gray (standard)</td>
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</tr>
<tr>
<td>GI Graphite</td>
<td>BL External Bubble</td>
</tr>
<tr>
<td>BK Black</td>
<td>CR Enhanced Corrosion Resistant Finish</td>
</tr>
<tr>
<td>BZ Bronze</td>
<td></td>
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<tr>
<td>DDB Dark Bronze</td>
<td></td>
</tr>
<tr>
<td>WH White</td>
<td></td>
</tr>
<tr>
<td>UP Unpainted</td>
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<table>
<thead>
<tr>
<th>Terminal Block</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>(blank) Terminal Block (standard)</td>
<td>Controls</td>
</tr>
<tr>
<td>T2 Wired to L1 and L2 Position</td>
<td>Dimming Control (Not CSA certified at 347 and 480 volts)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Notes:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Specifies a ROAM dimming enabled fixture with a dimming control module factory installed. NEMA photocontrol receptacle required. Additional hardware and services required ROAM deployment must be purchased separately.</td>
</tr>
</tbody>
</table>

Note: Specifications subject to change without notice. Actual performance may differ as a result of end-user environment and application.
### Autobahn Series ATB2
Roadway Lighting

#### Design Data

<table>
<thead>
<tr>
<th>Performance Package</th>
<th>Drive Current (mA)</th>
<th>Input Watts</th>
<th>Optic</th>
<th>4000K CCT</th>
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<tbody>
<tr>
<td></td>
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<td>Delivered Lumens</td>
</tr>
<tr>
<td>40B</td>
<td>525</td>
<td>69</td>
<td>R2</td>
<td>6680</td>
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<td>700</td>
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<td>17758</td>
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<td>R5</td>
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<td>213</td>
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<td>17679</td>
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<td>80B</td>
<td>525</td>
<td>137</td>
<td>R2</td>
<td>13145</td>
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<td></td>
<td>700</td>
<td>183</td>
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<td>R3</td>
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<td>13757</td>
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<td>700</td>
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<td>1000</td>
<td>280</td>
<td></td>
<td>23240</td>
</tr>
</tbody>
</table>

Note: Specifications subject to change without notice. Actual performance may differ as a result of end-user environment and application.
The EG300 is ideal for …

Highways and public roadways, parking lots, perimeter lighting and many other general lighting applications

New facilities where:
- Access to the electrical grid requires extensive trenching
- Grid connection is difficult or impossible
- Underground checks and/or permits are costly

Existing facilities where:
- Access to the electrical grid requires extensive trenching or environmental disruption
- Disruption of site will result in loss of business
- Underground wiring / conduit is nearing end of life
- Copper theft and vandalism is a concern

The Carmanah Difference:
- Reduced project cost when compared to other solar LED lighting systems: a result of superior uniformity and lumen output
- Adaptive lighting allows user to determine how light is applied
- Pole-top integrated design for easy installation and theft prevention
- Recyclable batteries & components
- Reliable, year-round performance

Capabilities:
- BetaLED™ LEDway™ fixture
- Up to two fixtures per unit
- Adaptive lighting (operating profiles)
- Standard IES distributions (Type II, III, IV, V)
- 6000K and 4300K colour temperature options
- CIE 115:2010 M2 - M6 classification

BetaLED™ Fixtures
The EG300 series features the BetaLED LEDway fixture. With superior uniformity and light performance, BetaLED fixtures allow Carmanah solar lighting systems to illuminate a given area with fewer systems than other solar solutions, providing significant savings in overall project cost.

Adaptive Lighting
Adaptive lighting allows for different light levels during the course of the night, based on vehicle and pedestrian activity. A choice of operating profiles permits the light to be dimmed or turned off completely when facility usage is reduced.

By dimming or turning the system off when light is not needed energy is conserved and light levels during peak hours are maximized. This allows for brighter illumination, smaller system size and lower system cost.

Energy Management System
The Energy Management System (EMS) is a critical part of the EG300 system providing bright, reliable light output and healthy, high-functioning lighting systems for years of autonomous operation.

The EMS provides:
- Efficient transfer and dynamic management of energy
- Seven operating profile options
- Smaller sized systems with greater lumen output
**SOLAR ENGINE**

<table>
<thead>
<tr>
<th></th>
<th>EG320</th>
<th>EG340</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPA*</td>
<td>0.69 m² (7.45 ft²)</td>
<td>1.32 m² (14.17 ft²)</td>
</tr>
<tr>
<td>APA</td>
<td>0.53 m² (5.73 ft²)</td>
<td>1.01 m² (10.90 ft²)</td>
</tr>
<tr>
<td>Weight (without batteries)</td>
<td>39 kg (85 lb)</td>
<td>59 kg (130 lb)</td>
</tr>
<tr>
<td>Weight (with batteries)</td>
<td>95 kg (210 lb)</td>
<td>175 kg (385 lb)</td>
</tr>
<tr>
<td>Dimension A</td>
<td>157.5 cm (62 in)</td>
<td>157.5 cm (62 in)</td>
</tr>
<tr>
<td>Dimension B</td>
<td>82.6 cm (32.5 in)</td>
<td>165.2 cm (65 in)</td>
</tr>
<tr>
<td>Watts</td>
<td>&gt;170</td>
<td>&gt;340</td>
</tr>
</tbody>
</table>

**BATTERIES**

<table>
<thead>
<tr>
<th></th>
<th>EG320</th>
<th>EG340</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>2 x group 27 absorbent glass mat (AGM)</td>
<td>4 x group 27 absorbent glass mat (AGM)</td>
</tr>
<tr>
<td>Rating</td>
<td>4,000 cycles to 20% depth of discharge at 20° C (68° F)</td>
<td></td>
</tr>
</tbody>
</table>

**FIXTURE**

<table>
<thead>
<tr>
<th></th>
<th>EG320</th>
<th>EG340</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEDway™</td>
<td>20 – 120 LEDs single fix.</td>
<td>20 – 60 LEDs/fix. dual fix.</td>
</tr>
</tbody>
</table>

**MOUNTING**

Solar Engine | Top of pole, round tenon | 8.9 cm (3.5 in) OD X 15.2 cm (6.0 in) long |
LEDway™      | Horizontal tenon | 4.25 cm (1.675 in) or 6 cm (2.375 in) OD |
Wind Load Rating | 250 kph (155 mph)** |

**ENERGY MANAGEMENT SYSTEM (EMS)**

<table>
<thead>
<tr>
<th>Optional Operating Profiles</th>
<th>Dusk-to-Dawn</th>
<th>Fixed Night, 6hr</th>
<th>Fixed Night, 8hr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Split Night 5hr, 25%, 2hr</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Split Night 5hr, 25%, 4hr</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Split Night 7hr, 25%, 2hr</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Split Night 7hr, 25%, 4hr</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Day/night transitioning | Via solar panels |
Status Indicators | Day/night transition, battery connection, low/high voltage disconnect |

**PHOTOMETRICS**

<table>
<thead>
<tr>
<th>Fixture Efficacy</th>
<th>Up to 85 lumens/watt</th>
</tr>
</thead>
<tbody>
<tr>
<td>IES Light Distributions</td>
<td>Type II, Type III, Type IV, Type V (backlight control available)</td>
</tr>
<tr>
<td>Other</td>
<td>International Dark-Sky Association (IDA) approved, measured for performance using IESNA standards, including IES BUG rating system</td>
</tr>
<tr>
<td>Photometry</td>
<td>Certified photometry per IESNA LM-79-2008 &amp; LM-80-2008</td>
</tr>
<tr>
<td>Typical Applications</td>
<td>Streets, roadways, parking lots, general site lighting</td>
</tr>
</tbody>
</table>

Photometric performance depends on the solar environment of location and specified operating profile. Contact a Carmanah representative for exact lumen output and specifications for your application.

**CLASSIFICATIONS**

<table>
<thead>
<tr>
<th></th>
<th>EG320</th>
<th>EG340</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIE</td>
<td>M4 - M6</td>
<td>M2 - M4</td>
</tr>
<tr>
<td>Mexico</td>
<td>Secondary residential Type A roadways or lower</td>
<td>Primary and collector ways or higher</td>
</tr>
<tr>
<td>Brazil</td>
<td>A3, B, C1 – C3 (L, M)</td>
<td>A3, B, C1 – C3 (L, M, I)</td>
</tr>
<tr>
<td>Chile</td>
<td>M4 – M5, P3 – P6, C4 – C5</td>
<td>M2 – M4, P1 – P3, C2 – C4</td>
</tr>
<tr>
<td>Colombia</td>
<td>M4 - M5</td>
<td>M2 - M4</td>
</tr>
<tr>
<td>Peru</td>
<td>III - V</td>
<td>II - III</td>
</tr>
<tr>
<td>Venezuela</td>
<td>E</td>
<td>C-D</td>
</tr>
</tbody>
</table>

**CERTIFICATIONS**

CE 2004-108-CE, EN 55015, EN 61547 for emissions and immunity

* Effective Projected Area (EPA) calculated as the Actual Projected Area (APA) multiplied by a drag coefficient of 1.3. EPA of engine only: does not include fixture EPA.
* 3 second gust as per AASHTO 2001
HDOT Phase 1

LIH – Lihue Airport
Exterior Lighting Upgrades

Materials Cut Sheets

Prepared by
Johnson Controls Lighting Services
GE Ecolux® UltraMax™ Starcoat® T8

- Passes TCLP, which can lower disposal costs.

**GENERAL CHARACTERISTICS**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lamp Type</td>
<td>Linear Fluorescent - Straight Linear</td>
</tr>
<tr>
<td>Bulb</td>
<td>T8</td>
</tr>
<tr>
<td>Base</td>
<td>Medium Bi-Pin (G13)</td>
</tr>
<tr>
<td>Rated Life</td>
<td>45000.0 hrs</td>
</tr>
<tr>
<td>Rated Life (instant start) @ Time</td>
<td>24000 h @ 3 h</td>
</tr>
<tr>
<td>Rated Life (rapid start) @ Time</td>
<td>45000.0 @ 3.0/50000.0 @ 12.0 h</td>
</tr>
<tr>
<td>Bulb Material</td>
<td>Soda lime</td>
</tr>
<tr>
<td>Starting Temperature (MIN)</td>
<td>15.0 °C</td>
</tr>
<tr>
<td>LEED-EB MR Credit</td>
<td>26 picograms Hg per mean lumen hour</td>
</tr>
<tr>
<td>Additional Info</td>
<td>TCLP compliant</td>
</tr>
<tr>
<td>Primary Application</td>
<td>Energy Saving</td>
</tr>
</tbody>
</table>

**PHOTOMETRIC CHARACTERISTICS**

- Initial Lumens: 2675.0
- Mean Lumens: 2515.0
- Nominal Initial Lumens per Watt: 95
- Color Temperature: 4100.0 K
- Color Rendering Index (CRI): 82.0
- S/P Ratio (Scotopic/Photopic Ratio): 1.8

**ELECTRICAL CHARACTERISTICS**

- Wattage: 28.0
- Voltage: 115.0
- Open Circuit Voltage (instant start) @ Temperature: 550 V @ 15 nV
- Cathode Resistance Ratio - Rh/Rc (MIN): 4.25
- Cathode Resistance Ratio - Rh/Rc (MAX): 6.5
- Lamp Current: 275.0 mA
- Current Crest Factor (MAX): 1.7

**DIMENSIONS**

- Maximum Overall Length (MOL): 48.0000 in (1219.2 mm)
- Minimum Overall Length: 47.7800 in (1213.6 mm)
- Nominal Length: 48.000 in (1219.2 mm)
- Bulb Diameter (DIA) (MIN): 0.940 in (23.9 mm)
- Bulb Diameter (DIA) (MAX): 1.100 in (27.9 mm)
- Bulb Diameter (DIA): 1.000 in (25.4 mm)
- Max Base Face to Base Face (A): 47.220 in (1199.4 mm)
- Face to End of Opposing Pin (B) (MIN): 47.400 in (1204.0 mm)
- Face to End of Opposing Pin (B) (MAX): 47.500 in (1206.5 mm)
- End of Base Pin to End of Opposite Pin End (C): 47.670 in (1210.8 mm)

**PRODUCT INFORMATION**

- Product Code: 72866
- Description: F28T8/XLSPX41ECO
- Standard Package: Case
- Standard Package GTIN: 10043168728666
- Standard Package Quantity: 36
- Sales Unit: Unit
- No Of Items Per Sales Unit: 1
- No Of Items Per Standard Package: 36
- UPC: 043168728669
The bright white radiance of GE’s LED commercial indoor/outdoor PAR38 lamps isn’t just something you see, it’s something you feel.

**LED commercial indoor/outdoor PAR38 lamps**

For indoor and outdoor applications, GE offers a multitude of wattage options with a high light output.

**LOW-COST OPERATION**
- For example, using only 26 watts of energy, save over $517 in energy costs over the rated life of the lamp versus a standard 120-watt halogen lamp based on $0.11 per kWh
- Energy efficiency and long life mean fewer lamp replacements versus standard incandescent and halogen light sources
- Ideal for both indoor and outdoor applications
- UL wet rated for outdoor applications

**EXCELLENT COLOR RENDERING**
- Available with a CRI of 82 - 84

**COLOR TEMPERATURE**
- Halogen-like color
- Available in 2700K, 3000K, 3500K, 4000K and 5000K

**LONG LIFE**
- Up to 25,000 hours rated life (L70)

**DIMMABLE**
- Dims from 100% to 10%

**BEAM PATTERNS**
- Available in 12˚, 15˚, 25˚, 35˚ and 40˚ beam patterns

**ENVIRONMENTALLY CONSCIOUS**
- These lamps are energy efficient and contain no lead or mercury

**GE QUALITY AND RELIABILITY**
- 3-year limited warranty

To learn more about saving money and energy, go to: [gelighting.com/ThinkLED](http://gelighting.com/ThinkLED)

When you Think LED lighting, Think GE.

**ecomagination™**
<table>
<thead>
<tr>
<th>Bulb Shape Base Type</th>
<th>Watts</th>
<th>Order Code</th>
<th>Description</th>
<th>Case Qty</th>
<th>MOL (In)</th>
<th>Lumens Initial</th>
<th>CBCP Initial Color Temp</th>
<th>CRI</th>
<th>Wattage Equivalent</th>
<th>*Rated Life L70 (Hrs)</th>
<th>Dimmable</th>
<th>ENERGY STAR® Status</th>
<th>#Location Rating</th>
<th>Additional Information</th>
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<tr>
<td>PAR38 MED 12 68111  LED12DP38S830/12</td>
<td>120</td>
<td>6</td>
<td>5.31</td>
<td>700</td>
<td>10000</td>
<td>3000</td>
<td>82</td>
<td>70W</td>
<td>25,000</td>
<td>Yes</td>
<td>★</td>
<td>Damp</td>
<td>Spot, 12° beam</td>
<td>Silver</td>
</tr>
<tr>
<td>68114 LED12DP38S827/12</td>
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<td>6</td>
<td>5.31</td>
<td>660</td>
<td>10000</td>
<td>2700</td>
<td>82</td>
<td>70W</td>
<td>25,000</td>
<td>Yes</td>
<td>★</td>
<td>Damp</td>
<td>Spot, 12° beam</td>
<td>Silver</td>
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<td>90150 LED12DP38W83025</td>
<td>120</td>
<td>6</td>
<td>5.12</td>
<td>950</td>
<td>4400</td>
<td>3000</td>
<td>84</td>
<td>85W</td>
<td>25,000</td>
<td>Yes</td>
<td>★</td>
<td>Wet</td>
<td>Narrow Flood, 25° beam</td>
<td>White</td>
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<tr>
<td>90151 LED12DP38W83035</td>
<td>120</td>
<td>6</td>
<td>5.12</td>
<td>950</td>
<td>2700</td>
<td>3000</td>
<td>84</td>
<td>85W</td>
<td>25,000</td>
<td>Yes</td>
<td>★</td>
<td>Wet</td>
<td>Flood, 35° beam</td>
<td>White</td>
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<tr>
<td>90132 LED12DP38W827/12 66114 LED12DP38S827/12</td>
<td>120</td>
<td>6</td>
<td>5.12</td>
<td>850</td>
<td>4000</td>
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<td>84</td>
<td>85W</td>
<td>25,000</td>
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<td>★</td>
<td>Wet</td>
<td>Narrow Flood, 25° beam</td>
<td>White</td>
</tr>
<tr>
<td>66113 LED12DP38W827/12 90159 LED12DP38S830/12</td>
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<td>6</td>
<td>5.12</td>
<td>1300</td>
<td>7600</td>
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<td>84</td>
<td>100W</td>
<td>25,000</td>
<td>Yes</td>
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<tr>
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<td>84</td>
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<tr>
<td>90154 LED12DP38W827/12</td>
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<td>6</td>
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<td>2700</td>
<td>84</td>
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<td>Yes</td>
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<td>94663 LED12DP38W827/40</td>
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<td>6</td>
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<td>8200</td>
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<td>100W</td>
<td>25,000</td>
<td>Yes</td>
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<td>100W</td>
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<td>Yes</td>
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<td>7000</td>
<td>2700</td>
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<td>100W</td>
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<td>White</td>
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<td>Silver</td>
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<td>3000</td>
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<td>Yes</td>
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<td>Silver</td>
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<td>130W</td>
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<td>Silver</td>
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<td>33647 LED26DP38S830/12</td>
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<td>5.31</td>
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<td>82</td>
<td>160W</td>
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<td>Yes</td>
<td>★</td>
<td>Wet</td>
<td>Spot, 12° beam</td>
<td>Silver</td>
</tr>
<tr>
<td>70591 LED26DP38S830/40</td>
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<td>6</td>
<td>5.31</td>
<td>1900</td>
<td>4000</td>
<td>3500</td>
<td>82</td>
<td>160W</td>
<td>25,000</td>
<td>Yes</td>
<td>★</td>
<td>Wet</td>
<td>Flood, 35° beam</td>
<td>Silver</td>
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<tr>
<td>15139 LED28P38S830/15</td>
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<td>6</td>
<td>5.31</td>
<td>2400</td>
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<td>130W</td>
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<td>-</td>
<td>Dry</td>
<td>Spot, 15° beam</td>
<td>Silver</td>
<td></td>
</tr>
</tbody>
</table>

Get more information at GELighting.com/ThinkLED

Information provided is subject to change without notice. Please verify all details with GE. All values are design or typical values when measured under laboratory conditions, and GE makes no warranty or guarantee, expressed or implied, that such performance will be obtained under end-use conditions.

* The life rating is based on the hours of operation the lamp will provide before reaching 70% of its original rating (L70).
** The location rating is based on the hours of operation the lamp will provide before reaching 70% of its original rating (L70).

**ENERGY STAR® status:** Certified as meeting ENERGY STAR® guidelines.

**UL 1993 Environmental Requirements for LED LAMPS**

- **Location, damp** – Exterior or interior location that is normally or periodically subject to condensation of moisture in, on, or adjacent to, electrical equipment, and includes partially protected locations.
- **Location, dry** – Location not normally subject to dampness, may include a location subject to temporary dampness, i.e., building under construction, provided ventilation is adequate to prevent an accumulation of moisture.
- **Location, wet** – Location in which water or other liquid can drip, splash, or flow on or against electrical equipment.

**Incandescent or Halogen wattage equivalencies based on ENERGY STAR® guidelines using lumens or CBCP according to lamp type**

Product is compliant with material restriction requirements of RoHS

ENERGY STAR® and the ENERGY STAR® logo are registered U.S. marks.
CAUTIONS & WARNINGS

R - WARNING: This lamp can cause serious skin burn and eye inflammation from shortwave ultraviolet radiation if outer envelope of the lamp is broken or punctured, and the arc tube continues to operate. Do not use where people will remain for more than a few minutes unless adequate shielding or other safety precautions are used. Certain types of lamps that will automatically extinguish when the outer envelope is broken or punctured are commercially available. Visit the FDA website for more information: http://www.fda.gov/cdrh/radhealth/products/urbans.html

Caution
• Lamp may shatter and cause injury if broken
  - Dispose of lamp in a closed container.
  - Do not use excessive force when installing lamp.
  - Do not use lamp if outer glass is scratched or broken.

Warning
• A damaged lamp emits UV radiation which may cause eye/skin injury
  - Turn power off if glass bulb is broken. Remove and dispose of lamp.
• Risk of Burn
  - Allow lamp to cool before handling.
  - Do not turn on lamp until fully installed.
• Risk of Electric Shock
  - Do not use where directly exposed to water or outdoors without an enclosed fixture.
  - Turn power off before inspection, installation or removal.
• Risk of Fire
  - Keep combustible materials away from lamp.
  - Use in fixture rated for this product.
• Unexpected lamp rupture may cause injury, fire, or property damage
  - Do not exceed rated voltage.
  - Do not turn on lamp until fully installed.
  - Do not use beyond rated life.
  - Do not use lamp if outer glass is scratched or broken.
  - Do not use where directly exposed to water or outdoors without an enclosed fixture.
  - Turn lamp off at least once for 15 minutes per week.
  - Use in enclosed fixture rated for this product.
  - Use only properly rated ballast.

GRAPHs & CHARTs
Graphs_Spectral Power Distribution

GENERAL CHARACTERISTICS
Lamp Type              High Intensity Discharge - Quartz Metal Halide
Bulb                   BD17
Base                   Medium Screw (E26)
Bulb Finish            Clear
Rated Life             10000.0 hrs
Bulb Material          Hard glass
Lamp Enclosure Type (LET) Enclosed fixtures only
Base Temperature (MAX) 190.0 °C
Bulb Temperature (MAX)  400.0 °C
LEED-EB MR Credit      261 picograms Hg per mean lumen hour

PHOTOMETRIC CHARACTERISTICS
Initial Lumens          3200.0
Mean Lumens             2100.0
Nominal Initial Lumens per Watt 64
Color Temperature       3700.0 K
Color Rendering Index (CRI) 60.0

ELECTRICAL CHARACTERISTICS
Wattage                 50.0
Burn Position           Universal burning position
Warm Up Time to 90% (MIN) 2.0 min
Warm Up Time to 90% (MAX) 5.0 min
Hot Restart Time to 90% (MIN) 10.0 min
Hot Restart Time to 90% (MAX) 15.0 min

DIMENSIONS
Maximum Overall Length  5.4300 in(137.9 mm)
(BOL)                  2.125 in(54.0 mm)
Bulb Diameter (DIA)    3.430 in(87.1 mm)
Light Center Length (LCL) 2.125

PRODUCT INFORMATION
Product Code            10361
Description             MXR50/U/MED
ANSI Codes              M110
Standard Package        Case
Standard Package GTIN   10043168103616
Standard Package Quantity 6
Sales Unit              Unit
No Of Items Per Sales Unit 1
No Of Items Per Standard 6
Package                 043168103619
## THE EDGE® LED Wall Pack

**Product Family**

<table>
<thead>
<tr>
<th>Product</th>
<th>Family</th>
<th>Optic</th>
<th>Mounting</th>
<th># of LEDs</th>
<th>LED Series</th>
<th>Voltage</th>
<th>Color Options</th>
<th>Drive Current</th>
<th>Factory-Installed Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEC EDG</td>
<td></td>
<td>3M²</td>
<td>WM²</td>
<td>02</td>
<td>D</td>
<td>UL</td>
<td>5V</td>
<td>350mA</td>
<td>40K 4000K Color Temperature²</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>04</td>
<td></td>
<td>Universal</td>
<td>Silver (Standard)</td>
<td>525mA</td>
<td>DIM 0–10V Dimming¹¹,¹²</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>06</td>
<td></td>
<td></td>
<td>8K</td>
<td>525mA</td>
<td>F Fuse¹³,¹¹,¹²,¹¹</td>
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<tr>
<td></td>
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<td></td>
<td></td>
<td>08</td>
<td></td>
<td></td>
<td>Black</td>
<td>700mA</td>
<td>P Photocell¹³</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>10</td>
<td></td>
<td></td>
<td>Bronze</td>
<td>700mA</td>
<td>ML Multi-Level (75/525)¹³</td>
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<tr>
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<td></td>
<td></td>
<td>12</td>
<td></td>
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<td>Platinum</td>
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<td>Bronze</td>
<td>700mA</td>
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<tr>
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<td></td>
<td></td>
<td>WH</td>
<td>700mA</td>
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</tr>
</tbody>
</table>

### Footnotes
1. IESNA Type III Medium distribution
2. IESNA Type III Medium distribution w/ backlight control
3. Wall mount
4. Available on fixtures with 20–80 LEDs
5. Available on fixtures with 20–60 LEDs
6. Color temperature per fixture; 5700K standard; minimum 70 CRI
7. Control by others
8. Refer to dimming spec sheet for availability and additional information
9. Not available when UH voltage is selected
10. When code dictates fusing use time delay fuse
11. Not available with all multi-level options. Refer to multi-level spec sheet for availability and additional information
12. Must specify voltage other than UL or UH
13. Refer to multi-level spec sheet for availability and additional information

### LED PERFORMANCE SPECS

#### 350mA Fixture Operating at 25º C (77º F)

<table>
<thead>
<tr>
<th># of LEDs</th>
<th>Initial Delivered Luminous Flux – Type III Medium @ 5700K</th>
<th>Initial Delivered Luminous Flux – Type III Medium with Backlight Control @ 5700K</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>1,814 (02)</td>
<td>1,342 (02)</td>
</tr>
<tr>
<td>40</td>
<td>3,628 (04)</td>
<td>2,683 (04)</td>
</tr>
<tr>
<td>60</td>
<td>5,371 (06)</td>
<td>3,997 (06)</td>
</tr>
<tr>
<td>80</td>
<td>7,161 (08)</td>
<td>5,341 (08)</td>
</tr>
<tr>
<td>100</td>
<td>8,929 (10)</td>
<td>6,503 (10)</td>
</tr>
<tr>
<td>120</td>
<td>10,715 (12)</td>
<td>7,926 (12)</td>
</tr>
</tbody>
</table>

#### 525mA Fixture Operating at 25º C (77º F)

<table>
<thead>
<tr>
<th># of LEDs</th>
<th>Initial Delivered Luminous Flux – Type III Medium @ 5700K</th>
<th>Initial Delivered Luminous Flux – Type III Medium with Backlight Control @ 5700K</th>
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</thead>
<tbody>
<tr>
<td>20</td>
<td>1,914 (02)</td>
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<td>80</td>
<td>7,161 (08)</td>
<td>5,341 (08)</td>
</tr>
<tr>
<td>100</td>
<td>8,929 (10)</td>
<td>6,503 (10)</td>
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<tr>
<td>120</td>
<td>10,715 (12)</td>
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#### 700mA Fixture Operating at 25º C (77º F)

<table>
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<th># of LEDs</th>
<th>Initial Delivered Luminous Flux – Type III Medium @ 5700K</th>
<th>Initial Delivered Luminous Flux – Type III Medium with Backlight Control @ 5700K</th>
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</thead>
<tbody>
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<td>5,792 (06)</td>
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<tr>
<td>80</td>
<td>7,161 (08)</td>
<td>5,341 (08)</td>
</tr>
<tr>
<td>100</td>
<td>8,929 (10)</td>
<td>6,503 (10)</td>
</tr>
<tr>
<td>120</td>
<td>10,715 (12)</td>
<td>7,926 (12)</td>
</tr>
</tbody>
</table>

### Notes:
- IESNA Type III Medium distribution
- IESNA Type III Medium distribution w/ backlight control
- Wall mount
- Available on fixtures with 20–80 LEDs
- Available on fixtures with 20–60 LEDs
- Color temperature per fixture; 5700K standard; minimum 70 CRI
- Control by others
- Refer to dimming spec sheet for availability and additional information
- Not available when UH voltage is selected
- When code dictates fusing use time delay fuse
- Not available with all multi-level options. Refer to multi-level spec sheet for availability and additional information
- Must specify voltage other than UL or UH
- Refer to multi-level spec sheet for availability and additional information

### LED PERFORMANCE SPECS

<table>
<thead>
<tr>
<th># of LEDs</th>
<th>Initial Delivered Luminous Flux – Type III Medium @ 5700K</th>
<th>Initial Delivered Luminous Flux – Type III Medium with Backlight Control @ 5700K</th>
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<tbody>
<tr>
<td>20</td>
<td>1,814 (02)</td>
<td>1,342 (02)</td>
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<td>3,628 (04)</td>
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<td>80</td>
<td>7,161 (08)</td>
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<tr>
<td>100</td>
<td>8,929 (10)</td>
<td>6,503 (10)</td>
</tr>
<tr>
<td>120</td>
<td>10,715 (12)</td>
<td>7,926 (12)</td>
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</tbody>
</table>

### Footnotes
- * For recommended lumen maintenance factor data see TD-13
- ** For more information on the IES BUG (Backlight-Uplight-Glare) Ratio visit www.iesna.org/PDF/Erratas/TM-15-07BugRatingsAddendum.pdf
**General Description**

Slim, low profile design. Fixture sides are rugged cast aluminum with integral, weather-tight LED driver compartments and high performance aluminum heatsinks specifically designed for LED applications. Housing is rugged aluminum. Furnished with low copper, lightweight mounting box designed for installation over standard and mud ring single gang J boxes. Secures to wall with four (4) 3/16" (4.8mm) screws (by others). Conduit entry from top, bottom, sides and rear. Allows mounting for uplight or downlight. Designed and approved for easy through-wiring. Includes leaf/debris guard. Five year limited warranty on fixture.

**Electrical**

Modular design accommodates varied lighting output from high power, white, 5700K (+/- 500K per full fixture), minimum 70 CRI, long life LED sources. Optional 4000K (+/- 300K per full fixture) also available. 120–277V 50/60 Hz, Class 1 LED drivers are standard. 347–480V 50/60 Hz driver is optional. LED drivers have power factor >90% and THD <20% at full load. Integral weather-tight J-box with leads (wire nuts) for easy power hook-up. Units provided with integral 10kV surge suppression protection standard. Surge protection tested in accordance with IEEE/ANSI C62.41.2.

**Testing & Compliance**

UL listed in the U.S. and Canada for wet locations and enclosure rated IP66 per IEC 60529. Consult factory for CE Certified products. Dark Sky Friendly, IDA Approved, RoHS compliant.

Product qualified on the Design Lights Consortium ("DLC") Qualified Products List ("QPL") when ordered without backlight control shield.

**Finish**

Exclusive Colorfast DeltaGuard ® finish features an E-Coat epoxy primer with an ultra-durable silver powder topcoat, providing excellent resistance to corrosion, ultraviolet degradation and abrasion. Bronze, black, white and platinum bronze powder topcoats are also available. The finish is covered by our 10 year limited warranty.

**Patents**

U.S. and international patents granted and pending. BetaLED is a division of Ruud Lighting, Inc. For a listing of Ruud Lighting, Inc. patents, visit www.uspto.gov.

**Field-installed Accessories**

- Bird Spikes
  - KA-BROS PK

**Photometrics**

**Independent Testing Laboratories certified test. Report No. ITL76293. Candlepower trace of 4000K, 60 LED Type III Medium security EDGE luminaire at 10' (3m) A.F.G. Luminaire with 8,465 initial delivered lumens operating at 700mA. Initial FC at grade.**

**Independent Testing Laboratories certified test. Report No. ITL68539. Candlepower trace of 4000K, 40 LED Type III Medium security EDGE luminaire with 8,835 initial delivered lumens operating at 725mA. All published luminaire photometric testing performed to IESNA LM-79-08 standards.**

**Independent Testing Laboratories certified test. Report No. ITL69538. Candlepower trace of 4000K, 40 LED Type III Medium w/ backlight control area luminaire with 5,084 initial delivered lumens operating at 700mA. All published luminaire photometric testing performed to IESNA LM-79-08 standards.**

**Independent Testing Laboratories certified test. Report No. ITL70203. Candlepower trace of 4000K, 60 LED Type III Medium security EDGE luminaire with 8,465 initial delivered lumens operating at 700mA. Initial FC at grade.**

**Independent Testing Laboratories certified test. Report No. ITL68539. Candlepower trace of 4000K, 40 LED Type III Medium security EDGE luminaire with 8,835 initial delivered lumens operating at 725mA. Initial FC at grade.**
Product Description

Slim, low profile design. Luminaire is constructed from rugged die cast and extruded aluminum components. LED driver is mounted in a sealed weather-tight center chamber that allows for access from below the luminaire. High performance aluminum heat sinks specifically designed for LED parking structure application. Pendant mount includes 36” (914mm) cord out of luminaire and is intended to be mounted by 3/4 IP pendant (by others).

Performance Summary

Utilizes BetaLED® Technology
Patented NanoOptic® Product Technology
Made in the U.S.A. of U.S. and imported parts
CRI: Minimum 70 CRI
CCT: 5700K (+/- 500K) Standard, 4000K (+/- 300K)

Warranty: 10 years on luminaire/10 years on Colorfast DeltaGuard® finish

Field Installed Accessories

<table>
<thead>
<tr>
<th>Accessory Code</th>
<th>Description</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>XA-PNDTTLVL</td>
<td>Leveler - for 0–13˚ sloped ceilings</td>
<td></td>
</tr>
<tr>
<td>XA-PS12KIT</td>
<td>12” (305mm) Pendant Kit</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pendant height from ceiling surface</td>
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<tr>
<td></td>
<td>to bottom of luminaire; mounting</td>
<td></td>
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<tr>
<td></td>
<td>accessory surface boxes will add</td>
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<tr>
<td></td>
<td>overall height</td>
<td></td>
</tr>
<tr>
<td>XA-PS18KIT</td>
<td>18” (457mm) Pendant Kit</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pendant height from ceiling surface</td>
<td></td>
</tr>
<tr>
<td></td>
<td>to bottom luminaire; mounting</td>
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</tr>
<tr>
<td></td>
<td>accessory or surface boxes will add</td>
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</tr>
<tr>
<td></td>
<td>overall height</td>
<td></td>
</tr>
<tr>
<td>XA-PS22KIT</td>
<td>22” (559mm) Pendant Kit</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pendant height from ceiling surface</td>
<td></td>
</tr>
<tr>
<td></td>
<td>to bottom luminaire; mounting</td>
<td></td>
</tr>
<tr>
<td></td>
<td>accessory or surface boxes will add</td>
<td></td>
</tr>
<tr>
<td></td>
<td>overall height</td>
<td></td>
</tr>
<tr>
<td>XA-PSFTG</td>
<td>Pendant Fitting</td>
<td></td>
</tr>
<tr>
<td>XA-XCPBRDGRT</td>
<td>Bird Guard</td>
<td></td>
</tr>
</tbody>
</table>

Ordering Information

Example: PKG-304-5M-PD-04-D-UL-SV-350-OPTIONS

<table>
<thead>
<tr>
<th>PKG-304</th>
<th>SM</th>
<th>PD</th>
<th>04</th>
<th>D</th>
<th>UL</th>
<th>SV</th>
<th>350</th>
<th>ML-40K</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product</td>
<td>Optic</td>
<td>Mounting</td>
<td>LED Count (x10)</td>
<td>Series</td>
<td>Voltage</td>
<td>Color Options</td>
<td>Drive Current</td>
<td>Options</td>
</tr>
<tr>
<td>PKG-304</td>
<td>SM Type V</td>
<td>Medium</td>
<td>PD</td>
<td>Pendant Mount</td>
<td>04</td>
<td>06</td>
<td>D</td>
<td>UL</td>
</tr>
<tr>
<td></td>
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</tr>
</tbody>
</table>

Options

- DIM: 0–10V Dimming
  - Control by others
  - Refer to dimming spec sheet for availability and additional information
  - Can’t exceed specified drive current
- F: Fuse
  - When code dictates fusing use time delay fuse
  - Not available with all multi-level options. Refer to multi-level spec sheet for availability and additional information
- ML: Multi-Level
  - Refer to multi-level spec sheet for availability and additional information

† See www.cree.com/lighting for warranty terms.
Product Specifications

CONSTRUCTION & MATERIALS
• Slim, low profile design
• Constructed from rugged die cast and extruded aluminum components
• LED driver is mounted in a sealed weather-tight center chamber that allows for access from below the luminaire
• High performance heat sinks specifically designed for LED parking structure application
• Pendant mount includes 36” (419mm) cord out of the luminaire and is intended to be mounted by 3/4 IP pendant (by others)
• Exclusive Colorfast DeltaGuard® finish features an E-Coat epoxy primer with an ultradurable powder topcoat, providing excellent resistance to corrosion, ultraviolet degradation and abrasion. Standard is silver. Bronze, black, white, and platinum bronze are also available

ELECTRICAL SYSTEM
• Input Voltage: 120–277V or 347–480V, 50/60Hz, Class 1 drivers
• Power Factor: > 0.9 at full load
• Total Harmonic Distortion: < 20% at full load
• Integral 10kV surge suppression protection standard
• To address inrush current, slow blow fuse or type C/D breaker should be used

REGULATORY & VOLUNTARY QUALIFICATIONS
• cULus Listed
• Suitable for wet locations
• Enclosure rated IP66 per IEC 60529 when ordered without ML options
• Consult factory for CE Certified products
• 10kV surge suppression protection tested in accordance with IEEE/ANSI C62.412
• Luminaire and finish endurance tested to withstand 5,000 hours of elevated ambient salt fog conditions as defined in ASTM Standard B 117
• RoHS Compliant
• Dark Sky Friendly, IDA Approved
• Meets Buy American requirements within ARRA

IES Files
To obtain an IES file specific to your project consult:

Photometry
All published luminaire photometric testing performed to IESNA LM-79-08 standards by Independent Testing Laboratories, a NVLAP certified laboratory.

Lumen Output, Electrical, and Lumen Maintenance Data

<table>
<thead>
<tr>
<th>Type V Medium Distribution</th>
<th>5000K</th>
<th>4000K</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LED Count (x10)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Initial Delivered Lumens</strong></td>
<td><strong>BUG Ratings</strong></td>
<td><strong>Initial Delivered Lumens</strong></td>
</tr>
<tr>
<td>120V</td>
<td>208V</td>
<td>240V</td>
</tr>
<tr>
<td>350mA @ 25˚C (77˚F)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D4</td>
<td>4,113</td>
<td>B3 U0 G1</td>
</tr>
<tr>
<td>O6</td>
<td>6,126</td>
<td>B3 U0 G2</td>
</tr>
<tr>
<td>525mA @ 25˚C (77˚F)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D4</td>
<td>5,768</td>
<td>B3 U0 G2</td>
</tr>
<tr>
<td>O6</td>
<td>8,576</td>
<td>B3 U0 G2</td>
</tr>
<tr>
<td>700mA @ 25˚C (77˚F)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D4</td>
<td>6,992</td>
<td>B3 U0 G2</td>
</tr>
<tr>
<td>O6</td>
<td>10,414</td>
<td>B3 U0 G2</td>
</tr>
</tbody>
</table>

* For more information on the IES BUG (Backlight-Uplight-Glare) Rating visit www.iesna.org/IES/IESBugRatingAddendum.pdf
** Projected L50 (10K) Hours: >60,000. For recommended lumen maintenance factor data see TD-13

ITL Test Report #: 66638
CAN-304-5M-***-06-D-UL-700
Initial Delivered Lumens: 10,893
Initial Delivered Lumens: 10,384
Initial FC at grade
304 Series™ PKG-304-PS-DM
Parking Structure Luminaire – Petroleum Symmetric – Direct Mount

Product Description
Slim, low profile design. Luminaire is constructed from rugged die cast and extruded aluminum components. LED driver is mounted in a sealed weather-tight center chamber that allows for access from below the luminaire. High performance aluminum heat sinks specifically designed for LED parking structure application. Mounting brackets designed to mount directly over existing single gang and octagonal junction boxes for direct mount.

Performance Summary
Utilizes BetaLED® Technology
Patented NanoOptic® Product Technology
Made in the U.S.A. of U.S. and imported parts
CRI: Minimum 70 CRI
CCT: 5700K (+/- 500K) Standard, 4000K (+/- 300K)
Warranty: 5 years on luminaire/10 years on Colorfast DeltaGuard® finish

Ordering Information
Example: PKG-304-PS-DM-04-D-UL-SV-350-OPTIONS

<table>
<thead>
<tr>
<th>PKG-304</th>
<th>PS</th>
<th>DM</th>
<th>04</th>
<th>D</th>
<th>UL</th>
<th>SV</th>
<th>700</th>
<th>40K-ML</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product</td>
<td>Optic</td>
<td>Mounting</td>
<td>LED Count (x10)</td>
<td>Series</td>
<td>Voltage</td>
<td>Color Options</td>
<td>Drive Current</td>
<td>Options</td>
</tr>
<tr>
<td>PKG-304</td>
<td>Petroleum</td>
<td>Symmetric</td>
<td>DM</td>
<td>Direct</td>
<td>Mount</td>
<td>04</td>
<td>06</td>
<td>04</td>
</tr>
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</tr>
</tbody>
</table>

40K-4000K Color Temperature
- Color temperature per fixture

DIM
- 0–10V Dimming
  - Control by others
  - Refer to dimming spec sheet for availability and additional information
  - Can't exceed specified drive current

F Fuse
- When code dictates fusing use time delay fuse
- Not available with all multi-level options. Refer to multi-level spec sheet for availability and additional information

ML Multi-Level
- Refer to multi-level spec sheet for availability and additional information

J Alternate Junction Box mounting

www.cree.com/lighting  T (800) 236-6800  F (262) 504-5415
Rev. Date 11/08/2012
Product Specifications

CONSTRUCTION & MATERIALS
- Slim, low profile design
- Constructed from rugged die cast and extruded aluminum components
- LED driver is mounted in a sealed weather-tight center chamber that allows for access from below the luminaire
- High performance heat sinks specifically designed for LED parking structure application
- Mounting bracket is designed to mount directly over existing single gang and octagonal junction boxes for direct mount
- Exclusive Colorfast DeltaGuard® finish features an E-Coat epoxy primer with an ultradurable powder topcoat, providing excellent resistance to corrosion, ultraviolet degradation and abrasion. Standard is silver. Bronze, black, white, and platinum bronze are also available

ELECTRICAL SYSTEM
- Input Voltage: 120–277V or 347–480V, 50/60Hz, Class 1 drivers
- Power Factor: > 0.9 at full load
- Total Harmonic Distortion: < 20% at full load
- Integral 10kV surge suppression protection standard
- To address inrush current, slow blow fuse or type C/D breaker should be used

REGULATORY & VOLUNTARY QUALIFICATIONS
- cULus Listed
- Suitable for wet locations
- Enclosure rated IP66 per IEC 60529 when ordered without ML options
- Consult factory for CE Certified products
- 10kV surge suppression protection tested in accordance with IEEE/ANSI C62.41.2
- Luminaire and finish endurance tested to withstand 5,000 hours of elevated ambient salt fog conditions as defined in ASTM Standard B 117
- RoHS Compliant
- Dark Sky Friendly, IDA Approved
- Meets Buy American requirements within ARRA

Photometry
All published luminaire photometric testing performed to IESNA LM-79-08 standards by Independent Testing Laboratories, a NVLAP certified laboratory.

IES Files
To obtain an IES file specific to your project consult:

Lumen Output, Electrical, and Lumen Maintenance Data

<table>
<thead>
<tr>
<th>Petroleum Symmetric Distribution</th>
<th>500K System Watts</th>
<th>400K System Watts</th>
<th>TOTAL CURRENT</th>
<th>50K Hours Projected Lumen Maintenance Factor** @ 15˚C (59˚F)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LED Count (x10)</strong></td>
<td>120V 208V 240V 277V 347V 480V</td>
<td>120V 208V 240V 277V 347V 480V</td>
<td>350mA @ 25˚C (77˚F)</td>
<td></td>
</tr>
<tr>
<td>Initial Delivered Lumens</td>
<td>93%</td>
<td>94%</td>
<td>94%</td>
<td>94%</td>
</tr>
<tr>
<td>BUG Ratings* Per TM-15-11</td>
<td>68 0.58 0.34 0.30 0.27 0.20 0.19 0.15 0.11</td>
<td>66 0.59 0.35 0.30 0.27 0.20 0.19 0.15 0.11</td>
<td>66 0.59 0.35 0.30 0.27 0.20 0.19 0.15 0.11</td>
<td>66 0.59 0.35 0.30 0.27 0.20 0.19 0.15 0.11</td>
</tr>
<tr>
<td>Initial Delivered Lumens</td>
<td>120V 208V 240V 277V 347V 480V</td>
<td>120V 208V 240V 277V 347V 480V</td>
<td>700mA @ 25˚C (77˚F)</td>
<td></td>
</tr>
<tr>
<td>700mA @ 25˚C (77˚F)</td>
<td>91%</td>
<td>93%</td>
<td>94%</td>
<td>94%</td>
</tr>
<tr>
<td>94%</td>
<td>94%</td>
<td>94%</td>
<td>94%</td>
<td></td>
</tr>
<tr>
<td>91%</td>
<td>93%</td>
<td>94%</td>
<td>94%</td>
<td></td>
</tr>
</tbody>
</table>

** Projected Lm(10K) Hours: >60,000. For recommended lumen maintenance factor data see TD-13
### 304 Series™ PKG-304-5M-DM
Parking Structure Luminaire – Type V Medium – Direct Mount

#### Product Description
Slim, low profile design. Luminaire is constructed from rugged die cast and extruded aluminum components. LED driver is mounted in a sealed weather-tight center chamber that allows for access from below the luminaire. High performance aluminum heat sinks specifically designed for LED parking structure application. Mounting brackets designed to mount directly over existing single gang and octagonal junction boxes for direct mount.

#### Performance Summary
- Utilizes BetaLED® Technology
- Patented NanoOptic® Product Technology
- Made in the U.S.A. of U.S. and imported parts
- CRI: Minimum 70 CRI
- CCT: 5700K (+/- 500K) Standard, 4000K (+/- 300K)

Warranty: 5 years on luminaire/10 years on Colorfast DeltaGuard® finish

---

#### Ordering Information
Example: PKG-304-5M-DM-04-D-UL-SV-350-OPTIONS

<table>
<thead>
<tr>
<th>PKG-304</th>
<th>SM</th>
<th>DM</th>
<th>04</th>
<th>D</th>
<th>UL</th>
<th>SV</th>
<th>700</th>
<th>40K-ML</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product</td>
<td>Optic</td>
<td>Mounting</td>
<td>LED Count (x10)</td>
<td>Series</td>
<td>Voltage</td>
<td>Color Options</td>
<td>Drive Current</td>
<td>Options</td>
</tr>
<tr>
<td>PKG-304</td>
<td>5M Type V Medium</td>
<td>DM Direct Mount</td>
<td>04 D</td>
<td>SV Silver (Standard)</td>
<td>700</td>
<td>700mA (Standard)</td>
<td>40K 4000K Color Temperature</td>
<td></td>
</tr>
</tbody>
</table>

- **40K 4000K Color Temperature**
  - Color temperature per fixture
- **DIM 0-10V Dimming**
  - Control by others
  - Refer to dimming spec sheet for availability and additional information
  - Can’t exceed specified drive current
- **F Fuse**
  - When code dictates fusing use time delay fuse
  - Not available with all multi-level options. Refer to multi-level spec sheet for availability and additional information
- **ML Multi-Level**
  - Refer to multi-level spec sheet for availability and additional information
- **J Alternate Junction Box mounting**
### Product Specifications

**CONSTRUCTION & MATERIALS**
- Slim, low profile design
- Constructed from rugged die cast and extruded aluminum components
- LED driver is mounted in a sealed weather-tight center chamber that allows for access from below the luminaire
- High performance heat sinks specifically designed for LED parking structure application
- Mounting bracket is designed to mount directly over existing single gang and octagonal junction boxes for direct mount
- Exclusive Colorfast DeltaGuard® finish features an E-Coat epoxy primer with an ultradurable powder topcoat, providing excellent resistance to corrosion, ultraviolet degradation and abrasion. Standard is silver. Bronze, black, white, and platinum bronze are also available

**ELECTRICAL SYSTEM**
- Input Voltage: 120–277V or 347–480V, 50/60Hz, Class 1 drivers
- Power Factor: > 0.9 at full load
- Total Harmonic Distortion: < 20% at full load
- Integral 10kV surge suppression protection standard
- To address inrush current, slow blow fuse or type C/D breaker should be used

**REGULATORY & VOLUNTARY QUALIFICATIONS**
- cULus Listed
- Suitable for wet locations
- Enclosure rated IP66 per IEC 60529 when ordered without ML options
- Consult factory for CE Certified products
- 10kV surge suppression protection tested in accordance with IEEE/ANSI C62.41.2
- Luminaire and finish endurance tested to withstand 5,000 hours of elevated ambient salt fog conditions as defined in ASTM Standard B 117
- RoHS Compliant
- Dark Sky Friendly, IDA Approved
- Meets Buy American requirements within ARRA

### Photometry

All published luminaire photometric testing performed to IESNA LM-79-08 standards by Independent Testing Laboratories, a NVLAP certified laboratory.

![Photometry Diagram](image_url)

### Lumen Output, Electrical, and Lumen Maintenance Data

#### Type V Medium Distribution

<table>
<thead>
<tr>
<th>LED Count (x10)</th>
<th>5700K</th>
<th>4000K</th>
<th>System Watts 120–480V</th>
<th>TOTAL CURRENT</th>
<th>50K Hours Projected Lumen Maintenance Factor** @ 15˚C (59˚F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Delivered Lumens</td>
<td>Initial Delivered Lumens</td>
<td>Initial Delivered Lumens</td>
<td>120V</td>
<td>208V</td>
<td>240V</td>
</tr>
<tr>
<td>400mA @ 25˚C (77˚F)</td>
<td>4.113</td>
<td>B3 U0 G1</td>
<td>3.791</td>
<td>82 U0 G1</td>
<td>47.9</td>
</tr>
<tr>
<td>626</td>
<td>B3 U0 G2</td>
<td>5.646</td>
<td>81 U0 G2</td>
<td>102.9</td>
<td>0.33</td>
</tr>
<tr>
<td>625mA @ 25˚C (77˚F)</td>
<td>5.768</td>
<td>B3 U0 G2</td>
<td>5.307</td>
<td>81 U0 G2</td>
<td>68</td>
</tr>
<tr>
<td>876</td>
<td>B3 U0 G2</td>
<td>7.904</td>
<td>81 U0 G2</td>
<td>102.9</td>
<td>0.33</td>
</tr>
<tr>
<td>700mA @ 25˚C (77˚F)</td>
<td>6.992</td>
<td>B3 U0 G2</td>
<td>6.444</td>
<td>81 U0 G2</td>
<td>94</td>
</tr>
<tr>
<td>1,114</td>
<td>B4 U0 G2</td>
<td>10,414</td>
<td>9,598</td>
<td>B3 U0 G2</td>
<td>141</td>
</tr>
</tbody>
</table>

** Projected L70 (10K) Hours: >60,000. For recommended lumen maintenance factor data see TD-13
# THE EDGE® LED Canopy Light – Type V Medium

**Product Family Optic Mounting # of LEDs LED Voltage Color Drive Current Factory-Installed Options**

<table>
<thead>
<tr>
<th>Product</th>
<th>Family</th>
<th>Optic</th>
<th>Mounting</th>
<th># of LEDs (x 10)</th>
<th>LED Series</th>
<th>Voltage</th>
<th>Color Options</th>
<th>Drive Current</th>
<th>Not Field Adjustable</th>
<th>Factory-Installed Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAN</td>
<td>EDG</td>
<td>5M³</td>
<td>DM²</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes:

- Type V Medium distribution
- Direct mount
- Uses 80 LED size with two blanks in outside positions
- Uses 100 LED size with two blanks in outside positions
- Available on fixtures with 40–160 LEDs
- Available on fixtures with 40–60 LEDs

Further notes:

- Color temperature per luminaire: 6000K standard; minimum 70 CRI
- Control by others
- Refer to dimming spec sheet for availability and additional information
- When code dictates fusing use time delay fuse
- Not available when UH voltage is selected
- Not available with all multi-level options. Refer to multi-level spec sheet for availability and additional information
- Must specify voltage other than UL or UH
- 120 LED maximum when 34 voltage is selected

---

**LED PERFORMANCE SPECS**

<table>
<thead>
<tr>
<th># of LEDs</th>
<th>Initial Delivered Lumen – Type V Medium @ 6000K</th>
<th>B U G Rating</th>
<th>Initial Delivered Lumen – Type V Medium @ 4300K</th>
<th>B U G Rating</th>
<th>System Watts 120–480V</th>
<th>Total Current @ 120V</th>
<th>Total Current @ 230V</th>
<th>Total Current @ 277V</th>
<th>Total Current @ 347V</th>
<th>Total Current @ 480V</th>
<th>L&lt;sub&gt;h&lt;/sub&gt; Hours* @ 25º C (77º F)</th>
<th>50K Hours Lumen Maintenance Factor* @ 10º C (59º F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td>1,550 (04)</td>
<td>2.11</td>
<td>1,550 (04)</td>
<td>2.11</td>
<td>12V @ 350mA</td>
<td>0.47</td>
<td>0.21</td>
<td>0.19</td>
<td>0.15</td>
<td>0.12</td>
<td>&gt;150,000</td>
<td>93%</td>
</tr>
<tr>
<td>60</td>
<td>1,930 (06)</td>
<td>3.27</td>
<td>1,930 (06)</td>
<td>3.27</td>
<td>12V @ 350mA</td>
<td>0.67</td>
<td>0.33</td>
<td>0.29</td>
<td>0.24</td>
<td>0.20</td>
<td>&gt;150,000</td>
<td>92%</td>
</tr>
<tr>
<td>80</td>
<td>2,550 (08)</td>
<td>4.34</td>
<td>2,550 (08)</td>
<td>4.34</td>
<td>12V @ 350mA</td>
<td>0.87</td>
<td>0.43</td>
<td>0.37</td>
<td>0.32</td>
<td>0.28</td>
<td>&gt;150,000</td>
<td>91%</td>
</tr>
<tr>
<td>100</td>
<td>3,200 (10)</td>
<td>5.49</td>
<td>3,200 (10)</td>
<td>5.49</td>
<td>12V @ 350mA</td>
<td>1.07</td>
<td>0.53</td>
<td>0.47</td>
<td>0.42</td>
<td>0.35</td>
<td>&gt;150,000</td>
<td>90%</td>
</tr>
<tr>
<td>120</td>
<td>3,870 (12)</td>
<td>6.77</td>
<td>3,870 (12)</td>
<td>6.77</td>
<td>12V @ 350mA</td>
<td>1.27</td>
<td>0.63</td>
<td>0.56</td>
<td>0.50</td>
<td>0.42</td>
<td>&gt;150,000</td>
<td>89%</td>
</tr>
<tr>
<td>140</td>
<td>4,590 (14)</td>
<td>8.43</td>
<td>4,590 (14)</td>
<td>8.43</td>
<td>12V @ 350mA</td>
<td>1.47</td>
<td>0.75</td>
<td>0.68</td>
<td>0.62</td>
<td>0.54</td>
<td>&gt;150,000</td>
<td>88%</td>
</tr>
<tr>
<td>160</td>
<td>5,380 (16)</td>
<td>10.14</td>
<td>5,380 (16)</td>
<td>10.14</td>
<td>12V @ 350mA</td>
<td>1.67</td>
<td>0.90</td>
<td>0.84</td>
<td>0.78</td>
<td>0.70</td>
<td>&gt;150,000</td>
<td>87%</td>
</tr>
<tr>
<td>200</td>
<td>6,990 (20)</td>
<td>13.84</td>
<td>6,990 (20)</td>
<td>13.84</td>
<td>12V @ 350mA</td>
<td>2.07</td>
<td>1.10</td>
<td>1.06</td>
<td>0.98</td>
<td>0.89</td>
<td>&gt;150,000</td>
<td>86%</td>
</tr>
<tr>
<td>240</td>
<td>8,960 (24)</td>
<td>17.08</td>
<td>8,960 (24)</td>
<td>17.08</td>
<td>12V @ 350mA</td>
<td>2.47</td>
<td>1.35</td>
<td>1.29</td>
<td>1.21</td>
<td>1.12</td>
<td>&gt;150,000</td>
<td>85%</td>
</tr>
</tbody>
</table>

*For recommended lumen maintenance factor data see TD-13

** For more information on the IES BUG (Backlight-Uplight-Glare) Rating visit www.iesna.org/PDF/Erratas/TM-15-07BugRatingsAddendum.pdf

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9201 Washington Ave • Racine, WI 53406-3772 • 800-236-6800 • www.betaLED.com

Made in the U.S.A. of U.S. and imported parts.
Meets Buy American requirements within the ARRA.
General Description
Slim, low profile, easy mounting below deck design. Luminaire sides are rugged cast aluminum with integral, weather-tight LED driver compartments and high performance aluminum heatsinks specifically designed for LED lighting application. J-Box sized to fit through existing 4-inch (102mm) diameter mount holes and is designed for through wiring and wet location installations. Luminaire mounts directly to canopy with lag bolts (by others). When mounting to solid surfaces, Adaptor Plate Kit accessory is required. Mating surface is gasketed to prevent water leak through. Includes bug/bird guard. Five year limited warranty on fixture.

Electrical
Modular design accommodates varied lighting output from high power, white, 6000K (+/- 500K per full fixture), minimum 70 CRI, long life LED sources. Optional 4300K (+/- 300K per full fixture) also available. 120–277V 50/60 Hz, Class 1 LED drivers are standard. 347–480V 50/60 Hz driver is optional. LED drivers have power factor >90% and THD <20% at full load. Units provided with integral 10kV surge suppression protection standard. Surge protection tested in accordance with IEEE/ANSI C62.41.2.

Testing & Compliance
UL listed in the U.S. and Canada for wet locations and enclosure rating IP66 per IEC 60529. Consult factory for CE Certified products. Dark Sky Friendly, IDA Approved. RoHS compliant.

Finish
Exclusive Colorfast DeltaGuard® finish features an E-Coat epoxy primer with an ultra-durable silver powder topcoat, providing excellent resistance to corrosion, ultraviolet degradation and abrasion. Bronze, black, white and platinum bronze powder topcoats are also available. The finish is covered by our 10 year limited warranty.

Field-Installed Accessories
Bird Spikes XA-BRDSPK
Adaptor Plate Kit XA-CLSB16
For use when mounting fixture to solid surfaces.

Photometrics
Independent Testing Laboratories certified test. Report No. ITL68282. Candlepower trace of 4300K, 120 LED Type V Medium area luminaire with 16,029 initial delivered lumens operating at 525mA.

All published luminaire photometric testing performed to IESNA LM-79-08 standards.
**LED PERFORMANCE SPECS**

<table>
<thead>
<tr>
<th># of LEDs</th>
<th>Initial Delivered Luminous @ 6000K</th>
<th>525mA Fixture Operating at 25º C (77º F)</th>
<th>50K Hours Lumen Maintenance Factor @ 15º C (59º F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td>4,432 (04)</td>
<td>3,322 (04)</td>
<td>93%</td>
</tr>
<tr>
<td>50</td>
<td>5,352 (06)</td>
<td>4,110 (06)</td>
<td>93%</td>
</tr>
<tr>
<td>60</td>
<td>6,169 (08)</td>
<td>4,505 (08)</td>
<td>93%</td>
</tr>
<tr>
<td>70</td>
<td>6,720 (08)</td>
<td>5,702 (08)</td>
<td>93%</td>
</tr>
<tr>
<td>80</td>
<td>7,280 (10)</td>
<td>6,305 (10)</td>
<td>93%</td>
</tr>
<tr>
<td>90</td>
<td>7,740 (10)</td>
<td>6,563 (10)</td>
<td>93%</td>
</tr>
<tr>
<td>100</td>
<td>8,200 (10)</td>
<td>6,841 (10)</td>
<td>93%</td>
</tr>
<tr>
<td>110</td>
<td>8,660 (10)</td>
<td>7,111 (10)</td>
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<td>120</td>
<td>9,120 (10)</td>
<td>7,391 (10)</td>
<td>93%</td>
</tr>
<tr>
<td>130</td>
<td>9,580 (10)</td>
<td>7,660 (10)</td>
<td>93%</td>
</tr>
<tr>
<td>140</td>
<td>10,040 (10)</td>
<td>7,939 (10)</td>
<td>93%</td>
</tr>
<tr>
<td>150</td>
<td>10,500 (10)</td>
<td>8,208 (10)</td>
<td>93%</td>
</tr>
<tr>
<td>160</td>
<td>10,960 (10)</td>
<td>8,477 (10)</td>
<td>93%</td>
</tr>
<tr>
<td>170</td>
<td>11,420 (10)</td>
<td>8,746 (10)</td>
<td>93%</td>
</tr>
<tr>
<td>180</td>
<td>11,880 (10)</td>
<td>8,995 (10)</td>
<td>93%</td>
</tr>
<tr>
<td>190</td>
<td>12,340 (10)</td>
<td>9,244 (10)</td>
<td>93%</td>
</tr>
<tr>
<td>200</td>
<td>12,800 (10)</td>
<td>9,493 (10)</td>
<td>93%</td>
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<tr>
<td>210</td>
<td>13,260 (10)</td>
<td>9,742 (10)</td>
<td>93%</td>
</tr>
<tr>
<td>220</td>
<td>13,720 (10)</td>
<td>9,991 (10)</td>
<td>93%</td>
</tr>
<tr>
<td>230</td>
<td>14,180 (10)</td>
<td>10,239 (10)</td>
<td>93%</td>
</tr>
<tr>
<td>240</td>
<td>14,640 (10)</td>
<td>10,488 (10)</td>
<td>93%</td>
</tr>
<tr>
<td>250</td>
<td>15,100 (10)</td>
<td>10,737 (10)</td>
<td>93%</td>
</tr>
<tr>
<td>260</td>
<td>15,560 (10)</td>
<td>10,986 (10)</td>
<td>93%</td>
</tr>
<tr>
<td>270</td>
<td>16,020 (10)</td>
<td>11,234 (10)</td>
<td>93%</td>
</tr>
<tr>
<td>280</td>
<td>16,480 (10)</td>
<td>11,483 (10)</td>
<td>93%</td>
</tr>
<tr>
<td>290</td>
<td>16,940 (10)</td>
<td>11,732 (10)</td>
<td>93%</td>
</tr>
<tr>
<td>300</td>
<td>17,400 (10)</td>
<td>11,981 (10)</td>
<td>93%</td>
</tr>
</tbody>
</table>

*For recommended lumen maintenance factor data see TD-13  
**For more information on the IES BUG (Backlight-Uplight-Glare) Rating visit www.iesna.org/PDF/Erratas/TM-15-07BugRatingsAddendum.pdf
General Description
Slim, low profile, easy mounting below deck design. Luminaire sides are rugged cast aluminum with integral, weather-tight LED driver compartments and high performance aluminum heatsinks specifically designed for LED lighting application. J-Box sized to fit through existing 4-inch (102mm) diameter mount holes and is designed for through wiring and wet location installations. Luminaire mounts directly to canopy with lag bolts (by others). When mounting to solid surfaces, Adaptor Plate Kit accessory is required. Mating surface is gasketed to prevent water leak through. Includes bug/bird guard. Five year limited warranty on fixture.

Electrical
Modular design accommodates varied lighting output from high power, white, 6000K (+/- 500K per full fixture), minimum 70 CRI, long life LED sources. Optional 4300K (+/- 300K per full fixture) also available. 120–277V 50/60 Hz, Class 1 LED drivers are standard. 347–480V 50/60 Hz driver is optional. LED drivers have power factor >90% and THD <20% at full load. Units provided with integral 10kV surge suppression protection standard. Surge protection tested in accordance with IEEE/ANSI C62.41.2.

Testing & Compliance
UL listed in the U.S. and Canada for wet locations and enclosure rating IP66 per IEC 60529. Consult factory for CE Certified products. Dark Sky Friendly. IDA Approved. RoHS compliant.

Finish
Exclusive Colorfast DeltaGuard® finish features an E-Coat epoxy primer with an ultra-durable silver powder topcoat, providing excellent resistance to corrosion, ultraviolet degradation and abrasion. Bronze, black, white and platinum bronze powder topcoats are also available. The finish is covered by our 10 year limited warranty.

Fixture and finish are endurance tested to withstand 5,000 hours of elevated ambient salt fog conditions as defined in ASTM Standard B 117.

Patents
U.S. and international patents granted and pending. BetaLED is a division of Ruud Lighting, Inc. For a listing of Ruud Lighting, Inc. patents, visit www.uspto.gov.

Field-Installed Accessories
Bird Spikes
XA-BRDSPK
For use when mounting fixture to solid surfaces.

Adaptor Plate Kit
XA-CLSB16
For use when mounting fixture to solid surfaces.

Photometrics
Independent Testing Laboratories certified test. Report No. ITL68092 Candlepower trace of 4300K, 120 LED Type V Short area luminaire with 17,059 initial delivered lumens operating at 525mA. All published luminaire photometric testing performed to IESNA LM-79-08 standards.

Isofootcandle plot of 4300K, 120 LED Type V Short area luminaire at 25 (7.6m) A.F.G. Luminaire with 17,045 initial delivered lumens operating at 525mA. Initial FC at grade.
### Product Description
Slim, low profile design minimizes wind load requirements. Luminaire sides are rugged cast aluminum with integral, weather-tight LED driver compartments and high performance aluminum heat sinks. Adjustable arm mount is rugged die cast aluminum and mounts to 2” (51mm) IP (2.375” [60mm] O.D.) tenon. Includes leaf/debris guard.

### Performance Summary
- Utilizes BetaLED® Technology
- Patented NanoOptic® Product Technology
- Made in the U.S.A. of U.S. and imported parts
- CRI: Minimum 70 CRI
- CCT: 5700K (+/- 500K) Standard, 4000K (+/- 300K)
- Warranty: 5 years on luminaire/10 years on Colorfast DeltaGuard® finish
- EPA and Weight: Reference EPA and Weight spec sheet

### Accessories
Field Installed Accessories

<table>
<thead>
<tr>
<th>XA-BRDSPK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bird Spikes</td>
</tr>
</tbody>
</table>

### Ordering Information
Example: FLD-EDG-70-AA-02-D-UL-SV-350-OPTIONS

<table>
<thead>
<tr>
<th>FLD-EDG</th>
<th>70</th>
<th>AA</th>
<th>D</th>
<th>LED Count (x10)</th>
<th>Voltage</th>
<th>Color Options</th>
<th>Drive Current</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>FLD-EDG</td>
<td>70</td>
<td>AA</td>
<td>D</td>
<td>02</td>
<td>UL 120-277V</td>
<td>SV 350mA</td>
<td>40K 4000K</td>
<td>40K 4000K Color Temperature</td>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>06</td>
<td>UH 347-480V</td>
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<tr>
<td></td>
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<td></td>
<td></td>
<td>08</td>
<td>34</td>
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<td></td>
<td></td>
<td></td>
<td>24</td>
<td>34</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Available on luminaires with 20–160 LEDs**
- **Available on luminaires with 20–60 LEDs**
Flood Luminaire - 70° Flood - Adjustable Arm Mount

Product Specifications

CONSTRUCTION & MATERIALS
- Slim, low profile, minimizing wind load requirements
- Luminaire sides are rugged die cast aluminum with integral, weather-tight LED driver compartments and high performance heat sinks
- Adjustable mounting arm is rugged die cast aluminum and mounts to 2” (51mm) IP (2.375” [60mm] O.D.) tenon
- Includes leaf/debris guard
- Exclusive Colorfast DeltaGuard® finish features an E-Coat epoxy primer with an ultradurable powder topcoat, providing excellent resistance to corrosion, ultraviolet degradation and abrasion. Standard is silver. Bronze, black, white, and platinum bronze are also available

ELECTRICAL SYSTEM
- Input Voltage: 120–277V or 347–480V, 50/60Hz, Class 1 drivers
- Power Factor: > 0.9 at full load
- Total Harmonic Distortion: < 20% at full load
- Integral weather-tight electrical box with terminal strips (12Ga–20Ga) for easy power hookup
- Integral 10kV surge suppression protection standard
- To address inrush current, slow blow fuse or type C/D breaker should be used

REGULATORY & VOLUNTARY QUALIFICATIONS
- cULus Listed
- Suitable for wet locations
- Enclosure rated IP66 per IEC 60529 when ordered without P or R options
- Significant to UL-508A, IEC 62262-1 and EN 60529 standards
- Certified to ANSI C136.31-2001, 3G bridge and overpass vibration standards
- 10kV surge suppression protection tested in accordance with IEEE/ANSI C62.412
- Luminaire and finish endurance tested to withstand 5,000 hours of elevated ambient salt fog conditions as defined in ASTM Standard B.117
- Product qualified on the DesignLights Consortium (“DLC”) Qualified Products List (“QPL”) when ordered without the backlight control shield
- RoHS Compliant
- Meets Buy American requirements within ARRA

PATENTS
- Visit website for patents that cover these products:
  Patents http://www.cree.com/patents

Photometry

All published luminaire photometric testing performed to IESNA LM-79-08 standards by Independent Testing Laboratories, a NVLAP certified laboratory.

Lumen Output, Electrical, and Lumen Maintenance Data

<table>
<thead>
<tr>
<th>LED Count (x10)</th>
<th>5700K</th>
<th>4000K</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Initial Delivered Lumens</td>
<td>Initial Delivered Lumens</td>
</tr>
<tr>
<td>120V</td>
<td>208V</td>
<td>240V</td>
</tr>
<tr>
<td>350mA @ 25°C (77°F)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q2</td>
<td>2.037</td>
<td>1.878</td>
</tr>
<tr>
<td>Q6</td>
<td>3.053</td>
<td>2.885</td>
</tr>
<tr>
<td>Q10</td>
<td>4.041</td>
<td>3.824</td>
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<tr>
<td>525mA @ 25°C (77°F)</td>
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<td></td>
</tr>
<tr>
<td>Q2</td>
<td>2.092</td>
<td>2.629</td>
</tr>
<tr>
<td>Q6</td>
<td>3.081</td>
<td>3.668</td>
</tr>
<tr>
<td>Q10</td>
<td>4.063</td>
<td>4.664</td>
</tr>
</tbody>
</table>

* Projected L70 (10K) Hours: > 60,000. For recommended lumen maintenance factor data see TD-13

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LED PERFORMANCE SPECS

<table>
<thead>
<tr>
<th>Product</th>
<th>Family</th>
<th>Optic</th>
<th>Mounting</th>
<th># of LEDs (x 10)</th>
<th>LED Series</th>
<th>Voltage</th>
<th>Color Options</th>
<th>Drive Current</th>
<th>Factory-Installed Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARE-EDG-3M-DA</td>
<td>THE EDGE® LED Area Light – Type III Medium</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Notes:**
  1. IESNA Type III Medium distribution
  2. Direct mounting arm for use with 3–6” (76–152mm) square or round pole
  3. Available on fixtures with 20–160 LEDs
  4. Control by others
  5. Refer to dimming spec sheet for availability and additional information
  6. Not available when UH voltage is selected
  7. Mounting Method
  8. IESNA Type III Medium
  9. Maintenance Factor
  10. Photocell by others

Footnotes:

- 1. Control by others
- 2. Photocell by others
- 3. IESNA Type III Medium distribution with backlight control
- 4. IESNA Type III Medium distribution with backlight control
- 5. IESNA Type III Medium distribution with backlight control
- 6. IESNA Type III Medium distribution with backlight control
- 7. IESNA Type III Medium distribution with backlight control
- 8. IESNA Type III Medium distribution with backlight control
- 9. IESNA Type III Medium distribution with backlight control
- 10. IESNA Type III Medium distribution with backlight control
- 11. IESNA Type III Medium distribution with backlight control
- 12. IESNA Type III Medium distribution with backlight control
- 13. IESNA Type III Medium distribution with backlight control
- 14. IESNA Type III Medium distribution with backlight control
- 15. Not available with all multi-level options. Refer to the multi-level spec sheet for availability and additional information
- 16. Refer to multi-level spec sheet for availability and additional information
- 17. Not available with all multi-level options. Refer to the multi-level spec sheet for availability and additional information
- 18. Multi-Level (75/550, dual circuit input) **
- 19. Multi-Level (75/550, dual circuit input) **
- 20. Multi-Level (75/550, dual circuit input) **
- 21. Multi-Level (75/550, dual circuit input) **
- 22. Multi-Level (75/550, dual circuit input) **
- 23. Multi-Level (75/550, dual circuit input) **
- 24. Multi-Level (75/550, dual circuit input) **
- 25. Multi-Level (75/550, dual circuit input) **
- 26. Multi-Level (75/550, dual circuit input) **
- 27. Multi-Level (75/550, dual circuit input) **
- 28. Multi-Level (75/550, dual circuit input) **
- 29. Multi-Level (75/550, dual circuit input) **
- 30. Multi-Level (75/550, dual circuit input) **
- 31. Multi-Level (75/550, dual circuit input) **
- 32. Multi-Level (75/550, dual circuit input) **
- 33. Multi-Level (75/550, dual circuit input) **
- 34. Multi-Level (75/550, dual circuit input) **
- 35. Multi-Level (75/550, dual circuit input) **
- 36. Multi-Level (75/550, dual circuit input) **
- 37. Multi-Level (75/550, dual circuit input) **
- 38. Multi-Level (75/550, dual circuit input) **
- 39. Multi-Level (75/550, dual circuit input) **
- 40. Multi-Level (75/550, dual circuit input) **
- 41. Multi-Level (75/550, dual circuit input) **
- 42. Multi-Level (75/550, dual circuit input) **
- 43. Multi-Level (75/550, dual circuit input) **
- 44. Multi-Level (75/550, dual circuit input) **
- 45. Multi-Level (75/550, dual circuit input) **
- 46. Multi-Level (75/550, dual circuit input) **
- 47. Multi-Level (75/550, dual circuit input) **
- 48. Multi-Level (75/550, dual circuit input) **
- 49. Multi-Level (75/550, dual circuit input) **
- 50. Multi-Level (75/550, dual circuit input) **
- 51. Multi-Level (75/550, dual circuit input) **
- 52. Multi-Level (75/550, dual circuit input) **
- 53. Multi-Level (75/550, dual circuit input) **
- 54. Multi-Level (75/550, dual circuit input) **
- 55. Multi-Level (75/550, dual circuit input) **
- 56. Multi-Level (75/550, dual circuit input) **
- 57. Multi-Level (75/550, dual circuit input) **
- 58. Multi-Level (75/550, dual circuit input) **
- 59. Multi-Level (75/550, dual circuit input) **
- 60. Multi-Level (75/550, dual circuit input) **

* For recommended lumen maintenance factor data see TD-13
** For more information on the IES BUG (Backlight-Uplight-Glare) Rating visit www.iesna.org/PDF/Erratas/TM-15-07BugRatingsAddendum.pdf

NOTE: All data subject to change without notice.
ARE-EDG-3M-DA  THE EDGE® LED Area Light – Type III Medium

Rev. Date: 8/23/11

General Description
Slim, low profile design minimizes wind load requirements. Fixture sides are rugged cast aluminum with integral, weather-tight LED driver compartments and high performance aluminum heatsinks. Convenient, interlocking mounting method. Mounting housing is rugged die cast aluminum and mounts to 3–6" (76–152mm) square or round pole. Fixture is secured by two (2) 5/16–18 UNC bolts spaced on 2" (51mm) centers. Includes leaf/debris guard. Five year limited warranty on fixture.

Electrical
Modular design accommodates varied lighting output from high power, white, 6000K (+/− 500K per full fixture), minimum 70 CRI, long life LED sources. Optional 4300K (+/− 300K per full fixture) also available. 120–277V 50/60 Hz Class 1 LED drivers are (+/− 300K per full fixture), minimum 70 CRI, long life LED sources. Optional 4300K (+/− 500K per full fixture), minimum 70 CRI, long life LED sources. Optional 4300K (+/− 300K per full fixture) also available. The finish is covered by our 10 year limited warranty.

Field-Installed Accessories
Photometrics

Photometrics

Bird Spikes

THE EDGE® EPA & Weight Calculations

Approximate Weight of LED Area Light – Type III Medium

<table>
<thead>
<tr>
<th># of 120–480V LEDs</th>
<th>Single</th>
<th>2@90º</th>
<th>3@90º</th>
<th>4@90º</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed Arm Mount</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>10</td>
<td>21.0 lbs. (9.5kg)</td>
<td>0.60</td>
<td>1.20</td>
<td>0.87</td>
</tr>
<tr>
<td>20</td>
<td>23.7 lbs. (10.8kg)</td>
<td>0.60</td>
<td>1.20</td>
<td>0.87</td>
</tr>
<tr>
<td>30</td>
<td>27.0 lbs. (12.3kg)</td>
<td>0.60</td>
<td>1.20</td>
<td>0.92</td>
</tr>
<tr>
<td>40</td>
<td>28.1 lbs. (12.8kg)</td>
<td>0.60</td>
<td>1.20</td>
<td>0.96</td>
</tr>
<tr>
<td>50</td>
<td>32.3 lbs. (14.7kg)</td>
<td>0.60</td>
<td>1.20</td>
<td>1.00</td>
</tr>
<tr>
<td>60</td>
<td>33.5 lbs. (15.2kg)</td>
<td>0.60</td>
<td>1.20</td>
<td>1.04</td>
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<tr>
<td>80</td>
<td>36.9 lbs. (16.7kg)</td>
<td>0.60</td>
<td>1.20</td>
<td>1.08</td>
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<tr>
<td>200</td>
<td>41.4 lbs. (18.8kg)</td>
<td>0.60</td>
<td>1.20</td>
<td>1.12</td>
</tr>
<tr>
<td>500</td>
<td>47.8 lbs. (21.7kg)</td>
<td>0.69</td>
<td>1.38</td>
<td>n/a²</td>
</tr>
</tbody>
</table>

1. Add 5 lbs. (2.3kg) for transformer in 347–480V fixtures when multi-level options are selected.
2. For applications requiring 200 or more LEDs at 90 degrees refer to the DL mount version of our spec sheet.

NOTE: All data subject to change without notice.

© 2011 BetaLED®, a division of Ruud Lighting • 1200 92nd Street • Sturtevant, WI 53177 • 800-236-6800 • www.betaLED.com

Made in the U.S.A. of U.S. and imported parts.

Meet or exceed requirements within the ENERGY STAR® Program.
Specifications

GENERAL DESCRIPTION
The Euro styled luminaire consists of a borosilicate glass optical assembly sheltered by a decorative formed reflector and a top mounted cast aluminum electrical assembly with a circumferential 1-1/2 inch reveal.

OPTICAL ASSEMBLY
The optical assembly consists of a thermal resistant prismatic glass lens mechanically held in a formed aluminum dooh frame. The door frame is attached to the spun cover with screws. Light from the LED module is distributed by precisely molded optical interface to maximize utilization, uniformity and luminaire spacing. Multiple boards are available for symmetrical or asymmetric distribution with various wattages.

ELECTRICAL ASSEMBLY
The cast aluminum electrical housing has a smooth domed contour. A terminal block is provided with a quick disconnect receptacle. The electrical housing is hinged with a tool-less latch to provide easy access to the gear assembly. The unitized electrical assembly, containing the electronic driver and other electrical components, plug into the quick disconnect receptacle. The pendant mount version has a 1-1/2 inch circumferential reveal. This housing has an integral 1-1/2 inch NPT threaded entry with stainless steel set screw. The arm mount version is provided with two U-bolts with washers and nuts and two leveling set screws that lock the housing to a 2 inch nominal (2-3/8" O.D.) horizontal arm and allow a +/- 5 degree adjustment from horizontal to the cover.

ELECTRICAL DRIVER
(Refer to the drive specification sheet for operating characteristics)

FINISH
The luminaire is finished with polyester powder paint to insure maximum durability.

LISTING
The luminaire is CSA listed as suitable for wet locations up to 40° C ambient temperature. IP rated.

WARRANTY
Limited warranty located at
www.acuitybrands.com/CustomerResources/Terms_and_conditions.aspx

NOTE
Actual performance may differ as a result of end-user environment and application.

Actual wattage may differ by +11% / -6% when operating between 120-480V +/- 10%.

Specification subject to change without notice.
6" LED Open Downlight
RLF6LEDG4
120V–277V
0-10V Dimming

APPLICATONS:
LiteFrame Retrofiuent RLF6LED is a 6" specification grade Retrofiunt LED retrofit downlight that combines superior brightness control with energy savings and low maintenance costs. The RLF6LED is designed specifically to retrofit into ceilings with existing recessed downlight fixtures without the need to remove the existing fixture. Suitable for a variety of commercial, retail, and institutional applications with ambient temperature up to 40°C (104°F) in open plenum applications.

HOUSING:
All components are made from quality die cast aluminum or galvaneal steel. Pre-wired j-box with snap-on cover for easy access. Snap-in connection from driver compartment allows easy installation of light engine/trim assembly without tools above or below the ceiling and can be upgraded to accommodate technology improvements. Approve for 8 (4 in/4 out) No. 12 AWG conductors rated for 90°C through wiring.

INSTALLATION:
All installation can be performed from below the ceiling without removing existing fixture.

REFLECTOR:

LED LIGHT ENGINE:
The RLF6LED uses the Philips Fortimo DLM Gen 4 LED Module with remote phosphor technology. This technology provides controlled color consistency (3 SCDM) from fixture to fixture. The system is designed for optional life and lumen maintenance (>50,000 hours at 70% lumen maintenance). Both reflector and light engine assembly are mechanically retained to housing. The light engine comes standard with 80 CRI in all Kelvin temperatures.

LED DRIVER:
The RLF6LED utilizes the Philips Fortimo LED Driver specifically designed to optimize efficiency of the Fortimo DLM Module. Driver is designed to match the 50,000 hour minimum life expectancy of the system. Meets UL Class 2, inherent short circuit protection, self limited, overload protected. If critical temperatures are reached on driver or LED module, integrated thermal feedback loop will gradually reduce current to protect system life. Driver is universal 120V/277V. Optional Lutron Series A driver is also available.

DIMMING:
Comes standard with 0-10V dimming capability. Flicker-free dimming to 10%. 0-10V control may consume up to 1mA. 0-10V, Lutron 2 wire, 3 wire, and EcoSystem dimming available to 1%.

CERTIFICATIONS:
CSA certified to US and Canadian safety standards. Suitable for wet locations. Approved for through wiring. Non-IC rated. ENERGY STAR qualified with open clear Alzak reflector.

WARRANTY:
5 year warranty. See www.prescolite.com for details.

CATALOG NUMBER:
Order housing, reflector, and accessories separately.

HOUSING/LED GENERATION VOLTAGE OPTIONS

<table>
<thead>
<tr>
<th>RLF6LEDG4</th>
<th>Blank</th>
<th>120V–277V</th>
</tr>
</thead>
<tbody>
<tr>
<td>6&quot; High Efficacy LED Housing</td>
<td>Blank</td>
<td>Standard 0-10V dimming to 10%</td>
</tr>
<tr>
<td>SD¹</td>
<td>Small Diameter</td>
<td></td>
</tr>
</tbody>
</table>

TRIM LED COLOR TEMP REF. FINISH LOWER REF. COLOR REF. OPTIONS

- 6LFDLED5G4 | 1100 Lumen Module |
- 6LFDLED6G4 | 1500 Lumen Module |
- 6LFDLED7G4 | 2000 Lumen Module |

| 30K | Blank | Semi-Diffuse |
| 35K | Blank |
| 40K |
| 30K | Blank |
| 35K | Blank |
| 40K |

ACCESSORIES

- LFSC6 | 6" reflector screw cover |
- LiteGear | See page 3 for availability |
- RWD6 | Retrofit wide diameter housing kit |

NOTES
1 See housing capability guide on page 3
2 Requires WT option also
3 For HDM, DM1, & 2DM options, housing output must match trim output

EXAMPLE: RLF6LEDG4 - 6LFDLEDG430K
EXAMPLE: RLF6LED7G4120HDM-6LFDLED7G435KWHWT

In a continuing effort to offer the best product possible we reserve the right to change, without notice, specifications or materials that in our opinion will not alter the function of the product.

Web: www.prescolite.com Tech Support: (888) 777-4832

A Division of Hubbell Lighting, Inc.
## Photometric Data

**Retrofiticient - 6" RLF6LEDG4 Downlight**

### Driver Data

<table>
<thead>
<tr>
<th>RLF6LEDG4 6FLED5G4 30K</th>
<th>RLF6LED7G4 30K</th>
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</thead>
<tbody>
<tr>
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<td>120-277V</td>
</tr>
<tr>
<td>Input Frequency</td>
<td>50/60 Hz</td>
</tr>
<tr>
<td>Input Current</td>
<td>0.12A (120v)</td>
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<tr>
<td>Input Power</td>
<td>14.5W</td>
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<tr>
<td>Constant Current Output</td>
<td>200–1000mA</td>
</tr>
<tr>
<td>Power Factor</td>
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<td>THD</td>
<td>&lt;20%</td>
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<tr>
<td>EMI Filtering</td>
<td>FCC 47/CFR</td>
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<tr>
<td>Operating Temperature</td>
<td>-20°C to 40°C</td>
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<tr>
<td>Dimming</td>
<td>0-10V</td>
</tr>
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### Zonal Lumen Summary

<table>
<thead>
<tr>
<th>Zone</th>
<th>Lumens</th>
<th>% Luminaire</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-30</td>
<td>602</td>
<td>52.0</td>
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<tr>
<td>0-40</td>
<td>967</td>
<td>83.6</td>
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<td>0-60</td>
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<td>0-90</td>
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<td>0-180</td>
<td>1157</td>
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### Luminance Data in Candela/Sq. Meter

<table>
<thead>
<tr>
<th>Angle in Vertical</th>
<th>Average</th>
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<tr>
<td>45°</td>
<td>18290</td>
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<tr>
<td>65°</td>
<td>382</td>
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<tr>
<td>75°</td>
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<tr>
<td>85°</td>
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### Coefficients of Utilization

**Zonal Cavity Method**

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<tr>
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</tbody>
</table>

**Test No. 8458**

Tested at 25°C Ambient in accordance to IESNA LM-79-2008

---

**RLF6LEDG4 6FLED5G4 30K**

LED Light Engine: 3000K, 80 CRI

System Wattage: 26.4W

Fixture Delivered Lumens: 1157

Fixture Efficacy: 80.0

Spacing Criteria: 1.2

### Candela Distribution

#### Deg - Candela Lumens

- **0**: 719
- **5**: 722, 69
- **15**: 756, 212
- **25**: 692, 321
- **35**: 597, 365
- **45**: 236, 181
- **55**: 4, 8
- **65**: 0, 0
- **75**: 0, 0
- **85**: 0, 0
- **90**: 0

### Zonal Lumen Summary

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### Coefficients of Utilization

**Zonal Cavity Method**

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</tbody>
</table>

**Test No. 8459**

Tested at 25°C Ambient in accordance to IESNA LM-79-2008

---

**RLF6LEDG4 6FLED7G4 30K**

LED Light Engine: 3000K, 80 CRI

System Wattage: 26.4W

Fixture Delivered Lumens: 1157

Fixture Efficacy: 80.0

Spacing Criteria: 1.2

### Candela Distribution

#### Deg - Candela Lumens

- **0**: 1263
- **5**: 1267, 122
- **15**: 1320, 370
- **25**: 1212, 561
- **35**: 1041, 637
- **45**: 391, 306
- **55**: 9, 15
- **65**: 2, 2
- **75**: 0, 0
- **85**: 0, 0
- **90**: 0

### Zonal Lumen Summary

<table>
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</tr>
<tr>
<td>85°</td>
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</tr>
</tbody>
</table>

### Coefficients of Utilization

**Zonal Cavity Method**

---

---

---
Central Inverters
For fixture full light output in back-up mode, Prescolite and Dual-lite have jointly tested the LiteFrame LED with the 100 (LG1) and 250 (LG2) VA LiteGear inverters. (Note: Not for use with integral EM option). For more information on LiteGear go to www.dual-lite.com/resources/litegear_luminaire_loading_chart/

<table>
<thead>
<tr>
<th>Ordering Guidelines</th>
<th>6 INCH</th>
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<tr>
<td>MIN</td>
<td>MAX</td>
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<tr>
<td>REQUIRES SD HOUSING OPTION</td>
<td>5-15/16</td>
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<tr>
<td>ALL STANDARD HOUSINGS</td>
<td>6-1/8</td>
</tr>
<tr>
<td>REQUIRES RWK KIT ACCESSORY &amp; WF REFLECTOR OPTION</td>
<td>6-1/2</td>
</tr>
</tbody>
</table>

Dimensions shown are for the diameter of the frame flange at its narrowest point.
HDOT Phase 2

LIH – Lihue Airport

Proposed Exterior Lighting Upgrades

Materials Cut Sheets

Prepared by

Johnson Controls Lighting Services
Easily upgrade to LED from fluorescent.

Philips InstantFit LED T8 and 4-pin long compact lamps are an ideal energy saving choice for existing fluorescent fixtures.

Perfect for a wide range of applications
- Full light output in spaces with temperatures down to -4°F (-20°C)
- Perfect for applications with frequent “on/off” switching cycles
- Buildings that desire to be mercury free

Easy to experience
- Compatible with a wide range of ballasts that include instant-start and programmed-start; select models are compatible with dimming ballasts¹
- Fits into existing linear fixtures
- Eliminates the need for rewiring and allows the fixture to maintain original UL and CSA compliance²

Energy savings
- 50% energy savings vs F32T8 electronic instant start systems³

Sustainable lighting solution
- No mercury allowing for non-hazardous waste disposal
- Emits virtually no UV rays or IR
- NSF Certified for use in food areas and refrigerated food displays
- 5-year limited warranty⁴

Footnotes on the page 3.
**Philips InstantFit LED T8 Lamps**

### Ordering, Electrical and Technical Data

<table>
<thead>
<tr>
<th>Product No.</th>
<th>Model No.</th>
<th>Ordering Code</th>
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<th>Base</th>
<th>CRI</th>
<th>Color Temp. (K)</th>
<th>Pkg Qty</th>
<th>Rated Avg. Life</th>
<th>MOL (In.)</th>
<th>Beam Angle</th>
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<tbody>
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<td>120-277, 347</td>
<td>G13</td>
<td>82</td>
<td>3000</td>
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<td>82</td>
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<td>10</td>
<td>50,000</td>
<td>48</td>
<td>160°</td>
</tr>
<tr>
<td>LED InstantFit T8 - 4’ Dimmable High Output</td>
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### Ballast Compatibility Guide

Please refer to www.philips.com/instantfit for instant start ballasts details and the latest ballast compatibility guide.

#### Relative Light Output vs. Ambient Temperature

**4’ T8 Lamps - 0.88 BF Ballast**

Suitable for use in fixtures where ambient temperature is between -4°F (-20°C) and 113°F (45°C).

**Warning:** Philips LED T8 InstantFit lamps will only operate properly on compatible Instant-start and Programmed-start ballasts. Please refer to the Philips LED T8 InstantFit Installation Guide, which can be obtained through your local Philips Sales Representative, or visit www.philips.com/instantfit

**FCC Note:** This device complies with Part 18 of the FCC Rules.
### Philips InstantFit LED T8 Lamps

#### Ordering, Electrical and Technical Data

<table>
<thead>
<tr>
<th>Product No.</th>
<th>Bare Lamp Watts (W)</th>
<th>Average System Watts (W)</th>
<th>Initial Lumens6</th>
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<td>High Ballast Factor (1.18)</td>
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**LED InstantFit T8 - 4’**

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**LED InstantFit T8 - 4’ Dimmable High Output**

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**LED InstantFit T8 - 4’ Ultra High Output**

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**LED InstantFit T8 - 4’ Glass**

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**LED InstantFit T8 U-Bent - 6’ High Output**

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**LED InstantFit 4-Pin long compact (PL-L) - 2’ High Output**

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1. Please refer to the InstantFit ballast compatibility guide @ www.philips.com/ instantfit. Compatibility subject to change as additional ballasts are tested. If you do not see your ballast on the compatibility list please contact your local Philips Lighting representative.
2. Must follow guidelines for installation from Philips Quick Installation Guide included with lamp shipment.
3. Lamp F32T8 Electronic Instant Start System with 0.88 Ballast Factor= 58 System Watts, (2) Philips LED T8 InstantFit >29 System Watts; 58 – 29 = 29 System Watts Saved. 29/58 = 50% Energy Saved
4. See warranty for terms and conditions at www.philips.com/warranties.
5. Tested to ISO L70 requirements with a ballast whose ballast factor is ≤ 0.88.
6. Photometric testing consistent with IES LM-79.

### System Power Compatibility Guide

This chart shows the measured system wattage of the Philips InstantFit TLED versus a comparable linear fluorescent lamp when used with the reference ballast.

<table>
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<th>Specification</th>
<th>Lamp Type</th>
<th>System Power (W)</th>
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<td>F32T8</td>
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<td>ICN-2P32-N</td>
<td>65</td>
</tr>
<tr>
<td></td>
<td>ICN-3P32-N</td>
<td>85</td>
</tr>
<tr>
<td></td>
<td>ICN-4P32-N</td>
<td>112</td>
</tr>
<tr>
<td></td>
<td>ICN-1P32-N</td>
<td>59</td>
</tr>
<tr>
<td></td>
<td>ICN-2P32-N</td>
<td>65</td>
</tr>
<tr>
<td></td>
<td>ICN-3P32-N</td>
<td>85</td>
</tr>
<tr>
<td></td>
<td>ICN-4P32-N</td>
<td>112</td>
</tr>
</tbody>
</table>

* Variance <10%
A19
LED Bulbs

Product Description
The Cree® LED A19 bulbs deliver up to 1100 lumens of warm 2700K light or cool 5000K light, while consuming at least 84% less energy than the incandescent bulbs they replace. These lamps feature a consistent and balanced omnidirectional light source within a real glass bulb, turn on instantly, and are compatible with most standard incandescent dimmers. Powered by Cree® LED Filament Tower™ Technology, the Cree® LED A19 bulbs are ENERGY STAR® qualified and are designed to last 25,000 hours.

Performance Summary
Utilizes Cree LED Filament Tower™ Technology
Made in the U.S.A. of U.S. and imported parts

Lamp Delivered Light Output:
- 450 lumens (40W eq)
- 800 lumens (60W eq)
- 1,100 lumens (75W eq)

Input Power:
- 6 watts (40W eq)
- 9.5 watts (60W 2700K eq)
- 9 watts (60W 5000K eq)
- 13.5 watts (75W eq)

CRI: 80
CCT: 2700K, 5000K*

Limited Warranty†: 3 years
Lifetime: Designed to last at least 25,000 hours
Dimming: Dimmable to 5% with select dimmers**
Must order in multiples of master carton (MC) quantities

Ordering Information
Example: A19-60W-27K-T24

<table>
<thead>
<tr>
<th>A19</th>
<th>Watt Equivalent</th>
<th>CCT</th>
<th>Voltage</th>
<th>Base</th>
<th>CRI</th>
<th>Packaging Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>A19</td>
<td>40W</td>
<td>2700 Kelvin</td>
<td>Blank</td>
<td>Blank</td>
<td>Blank</td>
<td>(6) Blister Pack bulbs in master carton (MC=6)</td>
</tr>
<tr>
<td></td>
<td>60 Watt (450 lumens)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>T24 - 40W &amp; 60W Equivalent</td>
</tr>
<tr>
<td></td>
<td>60 Watt (800 lumens)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(24) Tray Pack bulbs in master carton (Bulk Pack)</td>
</tr>
<tr>
<td></td>
<td>75 Watt (1100 lumens)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>T12 - 75W Equivalent</td>
</tr>
<tr>
<td></td>
<td>50 Watt</td>
<td>5000 Kelvin</td>
<td>120 Volt</td>
<td>E26 (scREW base)</td>
<td>80 CRI</td>
<td>(12) Tray Pack bulbs in master carton (Bulk Pack)</td>
</tr>
</tbody>
</table>

† See www.cree.com/lighting/products/warranty for warranty terms
* Not available for A19 40W equivalent
** Reference www.cree.com/lighting for recommended dimming controls

Click below to select Quick Ship products
A19-60W-27K-B1
For full list of Cree Quick Ship products visit www.cree.com/lighting/quickship

REV. DATE: V5 10/28/2014
Page 54 of 80
### Product Specifications

#### CONSTRUCTION & MATERIALS
- A-type bulb design weighs less than 4 ounces (113g) and uses a standard E26 screw base
- Silicon coated globe for increased safety
- Bulb meets ANSI standards for A19 dimensions
- Mercury free

#### OPTICAL SYSTEM
- Proprietary Cree LED Filament Tower™ creates perfect omnidirectional light distribution
- Glass globe offers increased optical spread

#### ELECTRICAL SYSTEM
- Power Factor: > 0.9 nominal
- Input Voltage: 120V
- Dimming: Dimmable to 5% with select dimmers
- Suitable for use in operating environments between -25˚C and +45˚C (-13˚F and +113˚F)

#### REGULATORY & VOLUNTARY QUALIFICATIONS
- cULus Listed
- Suitable for damp locations; not for use where exposed directly to weather or water
- Suitable for use in enclosed light fixtures
- **ENERGY STAR® qualified:** Please refer to http://www.energystar.gov/productfinder/product/certified-light-bulbs/results for most current information

### A19 B1
6 Blister Pack bulbs in master carton (MC = 6)

### A19 T24 -
40W & 60W Equivalents
(24) Tray Pack bulbs in master carton (Bulk Pack)

### A19 T12 -
75W Equivalents
(12) Tray Pack bulbs in master carton (Bulk Pack)

### Product Number | UPC | Description | Bulb Type | Watts | CCT | Lamps per Master Carton | Pallet Qty | CRI | Lumens | Rated Life (Hrs)
--- | --- | --- | --- | --- | --- | --- | --- | --- | --- | ---
A19-40W-27K-B1* | B10048028092 | 40W Warm White A19 Equivalent | A19 | 6W | 2700K | 6 | 480 | 80 | 450 | 25,000 |
A19-60W-27K-B1* | B10048028108 | 60W Warm White A19 Equivalent | A19 | 9.5W | 2700K | 6 | 480 | 80 | 800 | 25,000 |
A19-60W-50K-B1* | B10048028115 | 60W Daylight A19 Equivalent | A19 | 9W | 5000K | 6 | 480 | 80 | 800 | 25,000 |
A19-75W-27K-B1* | B49665001133 | 75W Warm White A19 Equivalent | A19 | 13.5W | 2700K | 6 | 480 | 80 | 1,100 | 25,000 |
A19-75W-50K-B1* | B49665001140 | 75W Daylight A19 Equivalent | A19 | 13.5W | 5000K | 6 | 480 | 80 | 1,100 | 25,000 |
A19-40W-27K-T24 | B10048028283 | 40W Warm White A19 Equivalent | A19 | 6W | 2700K | 24 | 1,296 | 80 | 450 | 25,000 |
A19-60W-27K-T24 | B10048028290 | 60W Warm White A19 Equivalent | A19 | 9.5W | 2700K | 24 | 1,296 | 80 | 800 | 25,000 |
A19-60W-50K-T24 | B10048028306 | 60W Daylight A19 Equivalent | A19 | 9W | 5000K | 24 | 1,296 | 80 | 800 | 25,000 |
A19-75W-27K-T12 | B49665001171 | 75W Warm White A19 Equivalent | A19 | 13.5W | 2700K | 12 | 130 | 80 | 1,100 | 25,000 |
A19-75W-50K-T12 | B49665001188 | 75W Daylight A19 Equivalent | A19 | 13.5W | 5000K | 12 | 130 | 80 | 1,100 | 25,000 |

*Must be ordered in quantities of 6
WPLED13N
LED 10W & 13 Wallpacks. Patent Pending thermal management system. 100,000 hour L70 lifespan. 5 Year Warranty.

Color: Bronze
Weight: 3.3 lbs

LED Info
- Watts: 13W
- Color Temp: 4000K (Neutral)
- Color Accuracy: 86
- L70 Lifespan: 100000
- LM79 Lumens: 673
- Efficacy: 45 LPW

Driver Info
- Type: Constant Current
- 120V: 0.13A
- 208V: 0.08A
- 240V: 0.07A
- 277V: 0.06A
- Input Watts: 15W
- Efficiency: 87%

Technical Specifications

UL Listing:
Suitable for Wet Locations as a Downlight. Suitable for Damp Locations as an Uplight. Wall Mount only. Suitable for Mounting within 4 ft. of ground.

Lumen Maintenance:
The LED will deliver 70% of its initial lumens at 100,000 hours of operation.

Cold Weather Starting:
The minimum starting temperature is -40°F/-40°C.

Ambient Temperature:
Suitable for use in 50°C (122°F) ambient temperatures.

Driver:
Multi-chip 13W high output long life LED Driver Constant Current, Class 2 100V - 277V, 50/60 Hz.

Surge Protection:
4KV

Color Temperature (Nominal CCT):
4000K

Fixture Efficacy:
44.6 Lumens per Watt

Color Accuracy:
86 CRI

Finish:
Our environmentally friendly polyester powder coatings are formulated for high-durability and long-lasting color, and contains no VOC or toxic heavy metals.

Color Consistency:
3-step MacAdam Ellipse binning to achieve consistent fixture-tofixture color.

Color Stability:
LED color temperature is warrantied to shift no more than 200K in CCT over a 5 year period.

Color Uniformity:

Green Technology:
RAB LEDs are Mercury and UV free.

Dark Sky Approved:
The International Dark Sky Association has approved this product as a full cutoff, fully shielded luminaire.

For use on LEED Buildings:
IDA Dark Sky Approval means that this fixture can be used to achieve LEED Credits for Light Pollution Reduction.

Patents:
The design of the LPACK is protected by U.S. Pat. D604,004 and patents pending in Canada, China and Taiwan.

California Title 24:
See WPLED13/PC for a 2013 California Title 24 compliant model.

IESNA LM-79 & IESNA LM-80 Testing:
RAB LED luminaires have been tested by an independent laboratory in accordance with IESNA LM-79 and 80, and have received the Department of Energy “Lighting Facts” label.

Gaskets:
High Temperature Silicone.
Warranty:
RAB warrants that our LED products will be free from defects in materials and workmanship for a period of five (5) years from the date of delivery to the end user, including coverage of light output, color stability, driver performance and fixture finish.

Equivalency:
The WPLED13 is Equivalent in delivered lumens to a 100W Metal Halide Wallpack.

HID Replacement Range:
The WPLED13 can be used to replace 70-150W Metal Halide Wallpacks based on delivered lumens.

Country of Origin:
Designed by RAB in New Jersey and assembled in the USA by RAB's IBEW Local 3 workers.

Buy American Act Compliant:
This product is a COTS item manufactured in the United States, and is compliant with the Buy American Act.

Recovery Act (ARRA) Compliant:
This product complies with the 52.225-21 "Required Use of American Iron, Steel, and Manufactured Goods--Buy American Act-- Construction Materials (October 2010).

Trade Agreements Act Compliant:
This product is a COTS item manufactured in the United States, and is compliant with the Trade Agreements Act.

GSA Schedule:
Suitable in accordance with FAR Subpart 25.4.
100,000 hour L70 lifespan. 5 Year Warranty.

Color: Bronze  Weight: 7.5 lbs

Technical Specifications

Listings
UL Listing:
Suitable for wet locations. Suitable for mounting within 1.2m (4ft) of the ground.

IESNA LM-79 & LM-80 Testing:
RAB LED luminaries have been tested by an independent laboratory in accordance with IESNA LM-79 and LM-80, and have received the Department of Energy “Lighting Facts” label.

Dark Sky Approved:
The International Dark Sky Association has approved this product as a full cutoff, fully shielded luminaire.

DLC Listed:
This product is on the Design Lights Consortium (DLC) Qualified Products List and is eligible for rebates from DLC Member Utilities.

LED Characteristics
Lifespan:
100,000-hour LED lifespan based on IES LM-80 results and TM-21 calculations.

LED:
Multi-chip, high-output, long-life LED

Color Consistency:
3-step MacAdam Ellipse binning to achieve consistent fixture-to-fixture color.

Color Stability:
LED color temperature is warrantied to shift no more than 200K in CCT over a 5 year period.

Color Uniformity:

Electrical
Driver:
Constant Current, Class 2, 100-277V, 50/60 Hz, 4 kV surge protection, 500mA, 100-240VAC: 0.3-0.15A, 277VAC: 0.15A, Power Factor: 99%

THD:
9.8% at 120V

Construction
Ambient Temperature:
Suitable for use in 40°C (104°F) ambient temperatures.

Cold Weather Starting:
The minimum starting temperature is -40°F/-40°C.

Thermal Management:
Superior heat sinking with external Air-Flow fins

Finish:
Our environmentally friendly polyester powder coatings are formulated for high-durability and long-lasting color, and contain no VOC or toxic heavy metals.

Reflector:
Semi-specular, vacuum-metalized polycarbonate

Gaskets:
High-temperature silicone gaskets

Housing:
Die-cast aluminum housing, lens frame and mounting arm

Mounting:
Heavy-duty mounting arm with "O" ring seal & stainless steel screws

Green Technology:
Mercury and UV free, and RoHS compliant. Polyester powder coat finish formulated without the use of VOC or toxic heavy metals.

Optical
Replacement:
The WPLED18 replaces 150W Metal Halide Wallpacks.

BUG Rating:
B1 U0 G0

Other
California Title 24:
WPLED18 with available photocell options comply with 2013 California Title 24 building and electrical codes as a commercial outdoor non-pole-mounted fixture ≤ 30 Watts. Add /PC, /PC2, /PCS or /PCS2 to RAB catalog number to add a photocell.

For Use on LEED Buildings:
IDA Dark Sky Approval means that this fixture can be used to achieve LEED Credits for Light Pollution Reduction.

Patents:
The design of WPLED18 is protected by US patent D608,040, Canada patent 138280, and China patent CN301649064S.

Warranty:
RAB warrants that our LED products will be free from defects in materials and workmanship for a period of five (5) years from the date of delivery to the end user, including coverage of light output, color stability, driver performance and fixture finish.

Need help? Tech help line: 888 RAB-1000 Email: sales@rabweb.com Website: www.rabweb.com
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Note: Specifications are subject to change at any time without notice

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**Technical Specifications (continued)**

**Other**

**Country of Origin:**
Designed by RAB in New Jersey and assembled in the USA by RAB's IBEW Local 3 workers.

**Buy American Act Compliant:**
This product is a COTS item manufactured in the United States, and is compliant with the Buy American Act.

**Recovery Act (ARRA) Compliant:**
This product complies with the 52.225-21 "Required Use of American Iron, Steel, and Manufactured Goods-- Buy American Act-- Construction Materials (October 2010)."

**Trade Agreements Act Compliant:**
This product is a COTS item manufactured in the United States, and is compliant with the Trade Agreements Act.

**GSA Schedule:**
Suitable in accordance with FAR Subpart 25.4.

---

**Dimensions**

![Diagram of Dimensions]

**Features**

Ultra-high efficiency LED 18 Watt wallpack
Replaces 150W Metal Halide Wallpacks
100,000-Hour LED Lifespan
5-Year Warranty

---

**Ordering Matrix**

<table>
<thead>
<tr>
<th>Family</th>
<th>Watts</th>
<th>Color Temp</th>
<th>Finish</th>
<th>Photocell</th>
</tr>
</thead>
<tbody>
<tr>
<td>WPLED</td>
<td>18 W</td>
<td>= Cool</td>
<td>= Bronze</td>
<td>= No Photocell</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Y = Warm</td>
<td>W = White</td>
<td>/PC = 120V Button</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N = Neutral</td>
<td></td>
<td>/PC2 = 277V Button</td>
</tr>
</tbody>
</table>

---

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Cree Edge™ Series
LED Security Wall Pack Luminaire

Product Description
The Cree Edge™ wall mount luminaire has a slim, low profile design. The luminaire end caps are made from rugged die cast aluminum with integral, weather-tight LED driver compartments and high performance aluminum heat sinks specifically designed for LED applications. Housing is rugged aluminum. Includes a lightweight mounting box for installation over standard and mud ring single gang J-Boxes. Secures to wall with four 3/16” (5mm) screws (by others). Conduit entry from top, bottom, sides and rear. Allows mounting for uplight or downlight. Designed and approved for easy through-wiring. Includes leaf/debris guard.

Applications: General area and security lighting

Performance Summary
Patented NanoOptic® Product Technology
Made in the U.S.A. of U.S. and imported parts
CRI: Minimum 70 CRI
CCT: 4000K (+/- 300K), 5700K (+/- 500K) standard
Limited Warranty*: 10 years on luminaire/10 years on Colorfast DeltaGuard® finish

*See www.cree.com/lighting/products/warranty for warranty terms

Accessories

<table>
<thead>
<tr>
<th>Field-Installed</th>
<th>Hand-Held Remote</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bird Spikes</td>
<td>XA-SENSREM</td>
</tr>
</tbody>
</table>

- For successful implementation of the programmable multi-level option, a minimum of one hand-held remote is required

LED Count (x10) | Dim. “A” | Weight |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>02</td>
<td>9.9” (251mm)</td>
<td>20 lbs. (9.1kg)</td>
</tr>
<tr>
<td>04</td>
<td>11.9” (303mm)</td>
<td>22 lbs. (10.0kg)</td>
</tr>
<tr>
<td>06</td>
<td>13.9” (353mm)</td>
<td>25 lbs. (11.3kg)</td>
</tr>
<tr>
<td>08</td>
<td>15.9” (404mm)</td>
<td>27 lbs. (12.3kg)</td>
</tr>
<tr>
<td>10</td>
<td>17.9” (455mm)</td>
<td>31 lbs. (14.1kg)</td>
</tr>
<tr>
<td>12</td>
<td>19.9” (505mm)</td>
<td>32 lbs. (14.5kg)</td>
</tr>
</tbody>
</table>

Ordering Information
Example: SEC-EDG-2M-WM-06-E-UL-SV-700

<table>
<thead>
<tr>
<th>SEC-EDG</th>
<th>WM</th>
<th>E</th>
<th>LED Count (x10)</th>
<th>Voltage</th>
<th>Color Options</th>
<th>Drive Current</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEC-EDG</td>
<td>2M</td>
<td>WM</td>
<td>Wall Mount</td>
<td>Universal 120-277V</td>
<td>BK, Black, Bronze, Silv, Wh, WH</td>
<td>350mA, 525mA</td>
<td>0-10V Dimming</td>
</tr>
<tr>
<td></td>
<td>2MB</td>
<td>02</td>
<td>Medium</td>
<td>Universal 120-277V</td>
<td>BK, Black, Bronze, Silv, Wh, WH</td>
<td>350mA, 525mA</td>
<td>Can’t exceed specified drive current</td>
</tr>
<tr>
<td></td>
<td>3S</td>
<td>04</td>
<td>Short</td>
<td>Universal 120-277V</td>
<td>BK, Black, Bronze, Silv, Wh, WH</td>
<td>350mA, 525mA</td>
<td>- Available with 20-80 LEDs</td>
</tr>
<tr>
<td></td>
<td>2SB</td>
<td>06</td>
<td>Short w/BLS</td>
<td>347-480V</td>
<td>BK, Black, Bronze, Silv, Wh, WH</td>
<td>350mA, 525mA</td>
<td>- Available with 20-60 LEDs</td>
</tr>
<tr>
<td></td>
<td>3M</td>
<td>08</td>
<td>Medium w/BLS</td>
<td>347V</td>
<td>BK, Black, Bronze, Silv, Wh, WH</td>
<td>350mA, 525mA</td>
<td>- Available with 20-80 LEDs</td>
</tr>
<tr>
<td></td>
<td>3MB</td>
<td>10</td>
<td>Medium w/BLS</td>
<td>347V</td>
<td>BK, Black, Bronze, Silv, Wh, WH</td>
<td>350mA, 525mA</td>
<td>- Available with 20-60 LEDs</td>
</tr>
<tr>
<td></td>
<td>3NB</td>
<td>12</td>
<td>Medium w/BLS</td>
<td>347V</td>
<td>BK, Black, Bronze, Silv, Wh, WH</td>
<td>350mA, 525mA</td>
<td>- Available with 20-60 LEDs</td>
</tr>
</tbody>
</table>

- Refer to Dimming spec sheet for details
- Refer to ML spec sheet for availability with ML options
- Must specify UL or 34 voltage
- Refer to ML spec sheet for details
- Intended for downlight applications of 0° tilt
- Photocell
- Intended for downlight applications of 0° tilt
- When code dictates fusing, use time delay fuse
- Refer to ML spec sheet for details

Rev. Date: V2 07/21/2015
Product Specifications

CONSTRUCTION & MATERIALS

• Slim, low profile design
• Luminaire sides are rugged die cast aluminum with integral, weathertight LED driver compartment and high performance aluminum heat sinks specifically designed for LED applications
• Housing is rugged aluminum
• Furnished with low copper, light weight mounting box designed for installation over standard and mud ring single gang J-Boxes
• Luminaire can also be directly mounted to a wall and surface wired
• Secures to wall with four 3/16” (5mm) screws (by others)
• Conduit entry from top, bottom, sides, and rear
• Allows mounting for uplight or downlight
• Designed and approved for easy through-wiring
• Includes leaf/debris guard
• Exclusive ColorFast DeltaGuard® finish features an E-Coat epoxy primer with an ultradurable powder topcoat, providing excellent resistance to corrosion, ultraviolet degradation and abrasion. Black, bronze, silver and white are available
• Weight: See Dimensions and Weight Chart on page 1

ELECTRICAL SYSTEM

• Input Voltage: 120–277V or 347–480V, 50/60Hz, Class 1 drivers
• Power Factor: > 0.9 at full load
• Total Harmonic Distortion: < 20% at full load
• Integral weathertight J-Box with leads (wire nuts) for easy power hook up
• Integral 10kV surge suppression protection standard
• To address inrush current, slow blow fuse or type C/D breaker should be used
• Maximum 10V Source Current: 20 LED (350mA): 10mA; 20LED (525 & 700 mA) and 40-120 LED: 0.15mA

REGULATORY & VOLUNTARY QUALIFICATIONS

• cULus Listed
• Suitable for wet locations
• Meets FCC Part 15 standards for conducted and radiated emissions
• Enclosure rated IP66 per IEC 60529 when ordered without P, PML or ML options
• 10kV surge suppression protection tested in accordance with IEEE/ANSI C62.117
• Luminaire and finish endurance tested to withstand 5,000 hours of elevated ambient salt fog conditions as defined in ASTM Standard B 117
• DLC qualified. Exceptions apply when ordered with full backlight control. Please refer to www.designlights.org/QPL for most current information
• Dark Sky Friendly, IDA Approved. Please refer to www.darksky.org/ for most current information
• Meets Buy American requirements within ARRA

Electrical Data*

<table>
<thead>
<tr>
<th>LED Count (x10)</th>
<th>System Watts</th>
<th>Total Current</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>120V</td>
<td>208V</td>
</tr>
<tr>
<td>350mA</td>
<td>0.21</td>
<td>0.13</td>
</tr>
<tr>
<td>02</td>
<td>0.36</td>
<td>0.23</td>
</tr>
<tr>
<td>04</td>
<td>0.52</td>
<td>0.31</td>
</tr>
<tr>
<td>08</td>
<td>0.75</td>
<td>0.44</td>
</tr>
<tr>
<td>10</td>
<td>1.10</td>
<td>0.63</td>
</tr>
<tr>
<td>12</td>
<td>1.10</td>
<td>0.63</td>
</tr>
<tr>
<td>525mA</td>
<td>0.30</td>
<td>0.19</td>
</tr>
<tr>
<td>02</td>
<td>0.58</td>
<td>0.34</td>
</tr>
<tr>
<td>04</td>
<td>0.84</td>
<td>0.49</td>
</tr>
<tr>
<td>08</td>
<td>1.13</td>
<td>0.66</td>
</tr>
<tr>
<td>700mA</td>
<td>0.41</td>
<td>0.25</td>
</tr>
<tr>
<td>02</td>
<td>0.78</td>
<td>0.46</td>
</tr>
<tr>
<td>04</td>
<td>1.14</td>
<td>0.65</td>
</tr>
</tbody>
</table>

Recommended Cree Edge™ Series Lumen Maintenance Factors (LMF)*

<table>
<thead>
<tr>
<th>Ambient</th>
<th>Initial LMF</th>
<th>25K hr Projected LMF</th>
<th>50K hr Projected LMF</th>
<th>75K hr Calculated LMF</th>
<th>100K hr Calculated LMF</th>
</tr>
</thead>
<tbody>
<tr>
<td>5˚C (41˚F)</td>
<td>1.04</td>
<td>0.99</td>
<td>0.97</td>
<td>0.95</td>
<td>0.93</td>
</tr>
<tr>
<td>10˚C (50˚F)</td>
<td>1.03</td>
<td>0.98</td>
<td>0.96</td>
<td>0.94</td>
<td>0.92</td>
</tr>
<tr>
<td>15˚C (59˚F)</td>
<td>1.02</td>
<td>0.97</td>
<td>0.95</td>
<td>0.93</td>
<td>0.91</td>
</tr>
<tr>
<td>20˚C (68˚F)</td>
<td>1.01</td>
<td>0.96</td>
<td>0.94</td>
<td>0.92</td>
<td>0.90</td>
</tr>
<tr>
<td>25˚C (77˚F)</td>
<td>1.00</td>
<td>0.95</td>
<td>0.93</td>
<td>0.91</td>
<td>0.89</td>
</tr>
</tbody>
</table>

*Lumen maintenance values at 25˚C are calculated per TM-21 based on LM-80 data and in-situ luminaire testing
*In accordance with IESNA TM-31-11. Projected Values represent interpolated value based on time durations that are within six times (6X) the IESNA LM-80-08 total test duration (in hours) for the device under testing (DUT) i.e. the packaged LED-chip
*In accordance with IESNA TM-31-11. Calculated Values represent time durations that exceed six times (6X) the IESNA LM-80-08 total test duration (in hours) for the device under testing (DUT) i.e. the packaged LED-chip
ARE-EDG-3M-DA
Cree Edge™ Area Luminaire – Type III Medium – Direct Arm Mount

Product Description
Slim, low profile design minimizes wind load requirements. Luminaire sides are rugged cast aluminum with integral, weathertight LED driver compartments and high performance aluminum heat sinks. Convenient, interlocking mounting method. Mounting housing is rugged die cast aluminum and mounts to 3–6” (76–152mm) square or round pole. Luminaire is secured by two 5/16-18 UNC bolts spaced on 2” (51mm) centers.

Performance Summary
Utilizes BetaLED® Technology
Patented NanoOptic® Product Technology
Made in the U.S.A. of U.S. and imported parts
CRI: Minimum 70 CRI
CCT: 5700K (+ / - 500K) Standard, 4000K (+ / - 300K)
Limited Warranty*: 10 years on luminaire / 10 years on Colorfast DeltaGuard® finish
EPA and Weight: Reference EPA and Weight spec sheet

Accessories

Field Installed Accessories

XA-BRDSPK
Bird Spikes

Ordering Information
Example: ARE-EDG-3M-DA-04-E-UL-SV-350-OPTIONS

<table>
<thead>
<tr>
<th>ARE-EDG</th>
<th>3M</th>
<th>DA</th>
<th>LED Count (x10)</th>
<th>Series</th>
<th>Voltage</th>
<th>Color Options</th>
<th>Drive Current</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARE-EDG</td>
<td>3M</td>
<td>DA</td>
<td>Direct Arm</td>
<td>04</td>
<td>UL</td>
<td>SV</td>
<td>350mA</td>
<td>40K 4000K Color Temperature</td>
</tr>
<tr>
<td></td>
<td>06</td>
<td></td>
<td></td>
<td>06</td>
<td>Universal</td>
<td>Silver (Standard)</td>
<td>525mA</td>
<td>- Color temperature per luminaire</td>
</tr>
<tr>
<td></td>
<td>08</td>
<td></td>
<td></td>
<td>08</td>
<td>Universal</td>
<td>Black</td>
<td>700mA</td>
<td>DIM 0–10V Dimming</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td></td>
<td></td>
<td>10</td>
<td>347–480V</td>
<td>Bronze</td>
<td>700mA</td>
<td>- Control by others</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td></td>
<td></td>
<td>12</td>
<td>34</td>
<td>Platinum Bronze</td>
<td>40K</td>
<td>- Refer to dimming spec sheet for details</td>
</tr>
<tr>
<td></td>
<td>14</td>
<td></td>
<td></td>
<td>14</td>
<td>347V</td>
<td>White</td>
<td>255mA</td>
<td>- Can’t exceed specified drive current</td>
</tr>
<tr>
<td></td>
<td>16</td>
<td></td>
<td></td>
<td>16</td>
<td>350mA</td>
<td></td>
<td>525mA</td>
<td>F Fuse</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td></td>
<td></td>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td>- When code dictates fusing, use time delay fuse</td>
</tr>
<tr>
<td></td>
<td>24</td>
<td></td>
<td></td>
<td>24</td>
<td></td>
<td></td>
<td></td>
<td>- Not available with all ML options. Refer to ML spec sheet for availability with ML options</td>
</tr>
</tbody>
</table>

* See www.cree.com/lighting/products/warranty for warranty terms
* Available on luminaires with 60–240 LEDs.
** Available on luminaires with 40–160 LEDs.
*** Available on luminaires with 40–60 LEDs.
Product Specifications

CONSTRUCTION & MATERIALS
- Slim, low profile, minimizing wind load requirements
- Luminaire sides are rugged die cast aluminum with integral, weathertight LED driver compartments and high performance heat sinks
- Convenient interlocking mounting method. Mounting housing is rugged die cast aluminum mounting to 3"-6" (76–152mm) square or round pole, secured by two 5/16-18 UNC bolts spaced on 2" (51mm) centers
- Includes leaf / debris guard
- Exclusive Colorfast DeltaGuard® finish features an E-Coat epoxy primer with an ultra-durable powder topcoat, providing excellent resistance to corrosion, ultraviolet degradation and abrasion. Standard is silver, Bronze, black, white, and platinum bronze are also available

ELECTRICAL SYSTEM
- Input Voltage: 120–277V or 347–480V, 50 / 60Hz, Class 1 drivers
- Power Factor: > 0.9 at full load
- Total Harmonic Distortion: < 20% at full load
- Integral weathertight electrical box with terminal strips (12Ga–20Ga) for easy power hookup
- Integral 10kV surge suppression protection standard
- To address inrush current, slow blow fuse or type C / D breaker should be used

REGULATORY & VOLUNTARY QUALIFICATIONS
- cULus Listed
- Suitable for wet locations
- Enclosure rated IP66 per IEC 60529 when ordered without P or R options
- Consult factory for CE Certified products
- Certified to ANSI C136.31-2001, 3G bridge and overpass vibration standards
- 10kV surge suppression protection tested in accordance with IEEE / ANSI C62.41.2
- Luminaire and finish endurance tested to withstand 5,000 hours of elevated ambient salt fog conditions as defined in ASTM Standard B 117
- Product qualified on the DesignLights Consortium™ (“DLC”) Qualified Products List (“QPL”) when ordered without full backlight control shield
- Meets Buy American requirements within ARRA

Photometry

All published luminaire photometric testing performed to IESNA LM-79-08 standards by a NVLAP certified laboratory.

IES Files
To obtain an IES file specific to your project consult:

Lumen Output, Electrical, and Lumen Maintenance Data

<table>
<thead>
<tr>
<th>System Watts</th>
<th>TOTAL CURRENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>120V</td>
<td>208V</td>
</tr>
<tr>
<td>120–480V</td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>System Watts</th>
<th>TOTAL CURRENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>120V</td>
<td>208V</td>
</tr>
<tr>
<td>120–480V</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>System Watts</th>
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</tr>
</thead>
<tbody>
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<td>120V</td>
<td>208V</td>
</tr>
<tr>
<td>120–480V</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>System Watts</th>
<th>TOTAL CURRENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>120V</td>
<td>208V</td>
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<tr>
<td>120–480V</td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>System Watts</th>
<th>TOTAL CURRENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>120V</td>
<td>208V</td>
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<tr>
<td>120–480V</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>System Watts</th>
<th>TOTAL CURRENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>120V</td>
<td>208V</td>
</tr>
<tr>
<td>120–480V</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>System Watts</th>
<th>TOTAL CURRENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>120V</td>
<td>208V</td>
</tr>
<tr>
<td>120–480V</td>
<td></td>
</tr>
</tbody>
</table>
ARE-EDG-3M-AA
Cree Edge™ Area Luminaire – Type III Medium – Adjustable Arm Mount

Product Description
Slim, low profile design minimizes wind load requirements. Luminaire sides are rugged cast aluminum with integral, weathertight LED driver compartments and high performance aluminum heat sinks. Adjustable arm mount is rugged die cast aluminum and mounts to 2” (51mm) IP; 2.375” (60mm) O.D. tenon. Includes leaf / debris guard.

Performance Summary
Utilizes BetaLED® Technology
Patented NanoOptic® Product Technology
Made in the U.S.A. of U.S. and imported parts
CRI: Minimum 70 CRI
CCT: 5700K (+ / - 500K) Standard, 4000K (+ / - 300K)

Limited Warranty:† 10 years on luminaire / 10 years on Colorfast DeltaGuard® finish
EPA and Weight: Reference EPA and Weight spec sheet

Accessories
Field Installed Accessories
XA-BRDSPK Bird Spikes

Ordering Information
Example: ARE-EDG-3M-AA-04-E-UL-SV-350-OPTIONS

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<th>ARE-EDG</th>
<th>3M</th>
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<th>E</th>
<th>LED Count (x10)</th>
<th>Dim. &quot;A&quot;</th>
<th>Voltage</th>
<th>Color Options</th>
<th>Drive Current</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARE-EDG</td>
<td>3M</td>
<td>AA</td>
<td>04</td>
<td>E UL Universal</td>
<td>04 12.1&quot; (306mm)</td>
<td>SV Silver (Standard)</td>
<td>350mA 4000K Color Temperature</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>06</td>
<td></td>
<td>06 14.1&quot; (357mm)</td>
<td>FK Black</td>
<td>350mA 4000K Color Temperature</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>08</td>
<td></td>
<td>08 16.1&quot; (408mm)</td>
<td>BZ Bronze</td>
<td>700mA 4000K Color Temperature</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>10</td>
<td></td>
<td>10 18.1&quot; (459mm)</td>
<td>PB Platinum Bronze</td>
<td>700mA 4000K Color Temperature</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>12</td>
<td></td>
<td>12 20.1&quot; (510mm)</td>
<td>WM White</td>
<td>700mA 4000K Color Temperature</td>
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<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>14</td>
<td></td>
<td>14 22.1&quot; (560mm)</td>
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<td>700mA 4000K Color Temperature</td>
<td></td>
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<tr>
<td></td>
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<td></td>
<td>16</td>
<td></td>
<td>16 24.1&quot; (612mm)</td>
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<td>700mA 4000K Color Temperature</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td>20</td>
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<td>20 28.1&quot; (713mm)</td>
<td></td>
<td>700mA 4000K Color Temperature</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>24</td>
<td></td>
<td>24 32.1&quot; (814mm)</td>
<td></td>
<td>700mA 4000K Color Temperature</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

† See www.cree.com/lighting/products/warranty for warranty terms
* Available on luminaires with 60–240 LEDs.
** Available on luminaires with 40–160 LEDs.
*** Available on luminaires with 40–60 LEDs.
Product Specifications

CONSTRUCTION & MATERIALS
- Slim, low profile, minimizing wind load requirements
- Luminaire sides are rugged die cast aluminum with integral, weathertight LED driver compartments and high performance heat sinks
- Adjustable mounting arm is rugged die cast aluminum and mounts to 2" (51mm) IP; 2.375" (60mm) O.D. tenon
- Includes leaf / debris guard
- Exclusive Colorfast DeltaGuard® finish features an E-Coat epoxy primer with an ultra-durable powder topcoat, providing excellent resistance to corrosion, ultraviolet degradation and abrasion. Standard is silver, Bronze, black, white, and platinum bronze are also available

ELECTRICAL SYSTEM
- Input Voltage: 120–277V or 347–480V, 50 / 60Hz, Class 1 drivers
- Power Factor: > 0.9 at full load
- Total Harmonic Distortion: < 20% at full load
- Integral weathertight electrical box with terminal strips (12Ga–20Ga) for easy power hookup
- Integral 10kV surge suppression protection standard
- To address inrush current, slow blow fuse or type C / D breaker should be used

REGULATORY & VOLUNTARY QUALIFICATIONS
- cULus Listed
- Suitable for wet locations
- Enclosure rated IP66 per IEC 60529 when ordered without P or R options
- Consult factory for CE Certified products
- Certified to ANSI C136.31-2001, 3G bridge and overpass vibration standards
- 10kV surge suppression protection tested in accordance with IEEE / ANSI C62.412
- Luminaire and finish endurance tested to withstand 5,000 hours of elevated ambient salt fog conditions as defined in ASTM Standard B 117
- Product qualified on the DesignLights Consortium™ (“DLC”) Qualified Products List (“QPL”) when ordered without full backlight control shield
- Meets Buy American requirements within ARRA

IES Files
To obtain an IES file specific to your project consult: http://www.cree.com/lighting/tools-and-support/exterior-ies-configuration-tool

Photometry
All published luminaire photometric testing performed to IESNA LM-79-08 standards by a NVLAP certified laboratory.

---

### Lumen Output, Electrical, and Lumen Maintenance Data

#### Type III Medium Distribution

<table>
<thead>
<tr>
<th>LED Color (xK)</th>
<th>5000K</th>
<th>4000K</th>
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<tbody>
<tr>
<td>Initial Delivered Lumens</td>
<td>Initial Delivered Lumens</td>
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</table>

<table>
<thead>
<tr>
<th>System Watts</th>
<th>120V</th>
<th>208V</th>
<th>240V</th>
<th>277V</th>
<th>347V</th>
<th>480V</th>
</tr>
</thead>
<tbody>
<tr>
<td>350mA @ 25°C (77°F)</td>
<td>600</td>
<td>600</td>
<td>600</td>
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<td>525</td>
<td>525</td>
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</table>

<table>
<thead>
<tr>
<th>TOTAL CURRENT</th>
<th>120V</th>
<th>208V</th>
<th>240V</th>
<th>277V</th>
<th>347V</th>
<th>480V</th>
</tr>
</thead>
<tbody>
<tr>
<td>120W</td>
<td>120W</td>
<td>120W</td>
<td>120W</td>
<td>120W</td>
<td>120W</td>
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</tr>
<tr>
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<td>208V</td>
<td>208V</td>
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<td>208V</td>
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</tr>
<tr>
<td>240V</td>
<td>240V</td>
<td>240V</td>
<td>240V</td>
<td>240V</td>
<td>240V</td>
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<tr>
<td>277V</td>
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<tr>
<td>347V</td>
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<td>480V</td>
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<td>480V</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>50K Hours Projected Lumen Maintenance Factor</th>
<th>95°C (203°F)</th>
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</thead>
<tbody>
<tr>
<td>95%</td>
<td>93%</td>
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</tbody>
</table>

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**Notes:**
- Photometric data tested in accordance with IES TM-15-11 and IES TM-13-08 standards by a NVLAP certified laboratory.
- For more information on the IES BUG (Backlight-Uplight-Glare) Rating visit: http://www.cree.com/lighting/tools-and-support/exterior-ies-configuration-tool
- **For recommended lumen maintenance factor data see 70-11. Calculated, l_/l_/ based on 6000 hours LM-80-08 testing > 10000 hours.**

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Product Description
Slim, low profile design minimizes wind load requirements. Luminaire sides are rugged cast aluminum with integral, weathertight LED driver compartments and high performance aluminum heat sinks. Convenient, interlocking mounting method. Mounting housing is rugged die cast aluminum and mounts to 3–6” (76–152mm) square or round pole. Luminaire is secured by two 5/16-18 UNC bolts spaced on 2” (51mm) centers.

Performance Summary
Utilizes BetaLED® Technology
Patented NanoOptic® Product Technology
Made in the U.S.A. of U.S. and imported parts

CRI: Minimum 70 CRI
CCT: 5700K (+ / - 500K) Standard, 4000K (+ / - 300K)

Limited Warranty*: 10 years on luminaire / 10 years on Colorfast DeltaGuard® finish

EPA and Weight: Reference EPA and Weight spec sheet

Accessories

<table>
<thead>
<tr>
<th>Field Installed Accessories</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>XA-BRDSPK</strong> Bird Spikes</td>
</tr>
</tbody>
</table>

Ordering Information
Example: ARE-EDG-4M-DA-04-E-UL-SV-350-OPTIONS

<table>
<thead>
<tr>
<th>ARE-EDG</th>
<th>4M</th>
<th>DA</th>
<th>LED Count (x10)</th>
<th>Voltage</th>
<th>Color Options</th>
<th>Drive Current</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARE-EDG</td>
<td>4M</td>
<td>DA</td>
<td>Direct Arm</td>
<td>04</td>
<td>Universal</td>
<td>120–277V</td>
<td>SV</td>
</tr>
<tr>
<td></td>
<td>06</td>
<td></td>
<td></td>
<td>06</td>
<td>Universal</td>
<td>120–277V</td>
<td>SV</td>
</tr>
<tr>
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<td>08</td>
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<td>08</td>
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<tr>
<td></td>
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<td>24</td>
<td></td>
<td></td>
<td>24</td>
<td>Universal</td>
<td>120–277V</td>
<td>SV</td>
</tr>
</tbody>
</table>

**40K 4000K Color Temperature**
- Color temperature per luminaire

**DIM 0–10V Dimming**
- Control by others
- Refer to dimming spec sheet for details
- Can’t exceed specified drive current

**F Fuse**
- When code dictates fusing, use time delay fuse
- Not available with all ML options. Refer to ML spec sheet for availability with ML options

**HL / Low (T75 / 350 / 525 Dual Circuit Input)**
- Refer to ML spec sheet for details
- Sensor not included

**P Photocell**
- Not available with all ML options. Refer to ML spec sheet for availability with ML options
- Most specify voltage other than UH

**NEMA Photocell Receptacle**
- Not available with all ML options. Refer to ML spec sheet for availability with ML options
- Photocell by others

**ML Multi-Level**
- Refer to ML spec sheet for details

---

† See www.cree.com/lighting/products/warranty for warranty terms
* Available on luminaires with 60–240 LEDs.
** Available on luminaires with 40–160 LEDs.
*** Available on luminaires with 40–60 LEDs.
**Product Specifications**

**CONSTRUCTION & MATERIALS**
- Slim, low profile, minimizing wind load requirements
- Luminaire sides are rugged die cast aluminum with integral, weather-tight LED driver compartments and high performance heat sinks
- Convenient interlocking mounting method. Mounting housing is rugged die cast aluminum mounting to 3-6" (76-152mm) square or round pole, secured by two 5/16" UNC bolts spaced on 2" (51mm) centers
- Includes leaf / debris guard
- Exclusive Colorfast DeltaGuard® finish features an E-Coat epoxy primer with an ultra-durable powder topcoat, providing excellent resistance to corrosion, ultraviolet degradation and abrasion. Standard is silver. Bronze, black, white, and platinum bronze are also available

**ELECTRICAL SYSTEM**
- Input Voltage: 120–277V or 347–480V, 50 / 60Hz, Class 1 drivers
- Power Factor: > 0.9 at full load
- Total Harmonic Distortion: < 20% at full load
- Integral weather-tight electrical box with terminal strips (12Ga–20Ga) for easy power hookup
- Integral 10kV surge suppression protection standard
- To address inrush current, slow blow fuse or type C / D breaker should be used

**REGULATORY & VOLUNTARY QUALIFICATIONS**
- cULus Listed
- Suitable for wet locations
- Enclosure rated IP66 per IEC 60529 when ordered without P or R options
- Consult factory for CE Certified products
- Certified to ANSI C136.31-2001, 3G bridge and overpass vibration standards
- 10kV surge suppression protection tested in accordance with IEEE / ANSI C62.412
- Luminaire and finish endurance tested to withstand 5,000 hours of elevated ambient salt fog conditions as defined in ASTM Standard B 117
- Product qualified on the DesignLights Consortium™ (“DLC”) Qualified Products List (“QPL”) when ordered without full backlight control shield
- Meets Buy American requirements within ARRA

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### Photometry

All published luminaire photometric testing performed to IESNA LM-79-08 standards by a NVLAP certified laboratory.

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**Lumen Output, Electrical, and Lumen Maintenance Data**

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<th>Type IV Medium Distribution</th>
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<th>4000K</th>
<th>System Watts</th>
<th>TOTAL CURRENT</th>
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<td>BUS Rating**</td>
<td>Initial Delivered Lumens*</td>
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* Actual production yield may vary between –4% and +10% of initial delivered lumens.
** For more information on the IES BUG (Backlight-Uplight-Glare) Rating visit http://www.cree.com/patents for patents that cover these products. Cree®, the BetaLED Technology logo, and Colorfast DeltaGuard® are registered trademarks, and Cree Edge® is a trademark of Cree, Inc. The UL logo is a registered trademark of UL LLC. DesignLights Consortium™ and the DLC QPL logo are trademarks of Northeast Energy Efficiency Partnerships, Inc.
PRODUCT OVERVIEW

Features:

OPTICAL
- Same Light: Performance is comparable to 250-400W HPS roadway luminaires.
- White Light: Correlated color temperature - standard 4000K, 70 CRI minimum or optional 5000K, 70 CRI minimum.
- Unique IP66 rated LED light engines provided 0% uplight and restrict backlight to within sidewalk depth, providing optimal application coverage and optimal pole spacing.
- Available in Type II, III, IV, & V roadway distributions.

ELECTRICAL
- Expected Life: LED light engines are rated >100,000 hours at 25°C, L70.
- Electronic driver has an expected life of 100,000 hours at a 25°C ambient.
- Lower Energy: Saves an average of 40-60% over comparable HPS platforms.
- Robust Surge Protection: Three different surge protection options provide a minimum of IEEE/ANSI C62.41 Category C (10kV/5kA) protection. 20kV/10kA protection is also available.

MECHANICAL
- Easy to Maintain: Includes standard AEL lineman-friendly features such as tool-less entry, 3 station terminal block and quick disconnects. Bubble level located inside the electrical compartment for easy leveling at installation.
- Rugged die-cast aluminum housing is polyester powder-coated for durability and corrosion resistance. Rigorous five-stage pre-treating and painting process yields a finish that achieves a scribe creepage rating of 8 (per ASTM D1654) after over 1000 hours exposure to salt fog chamber (operated per ASTM B117). Optional Enhanced Corrosion Resistant finish (CR) increases the salt spray exposure to 5000 hours.
- Four-bolt mast arm mount is adjustable for arms from 1-1/4” to 2” (1-5/8” to 2-3/8” O.D.) diameter and provides a 3G vibration rating per ANSI C136.

Wildlife shield is cast into the housing (not a separate piece).

CONTROLS
- NEMA 3 Pin photocontrol receptacle is standard, with the Acuity designed ANSI 5 Pin and 7 Pin receptacles optionally available.
- Premium solid state locking sale photocontrol - PCSS (10 year rated life).
- Extreme long life sold state locking style photocontrol - PCLL (20 year rated life).
- Multi-level dimming available to provide scheduled dimming as specified by the customer.
- Optional onboard Adjustable Output module allows the light output and input wattage to be modified to meet site specific requirements, and can also allow a single fixture to be flexibly applied in many different applications.

STANDARDS
- DesignLights Consortium® (DLC) qualified product. Not all versions of this product may be DLC qualified. Please check the DLC Qualified Products List at www.designlights.org/QPL to confirm which versions are qualified.
- Rated for -40°C to 40°C ambient.
- CSA Certified to U.S. and Canadian standards
**ORDERING INFORMATION**

**Autobahn Series ATB2**

**Roadway Lighting**

**Example:** ATB2 40LEDE70 MVOLT R2

<table>
<thead>
<tr>
<th>Series</th>
<th>Performance Packages</th>
<th>Voltage</th>
<th>Optics</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATB2</td>
<td>40BLEDE70 40B Chips, 700mA Driver</td>
<td>MVOLT Multi-volt, 120-277V</td>
<td>R2 Roadway Type II</td>
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<td>40BLEDE10 40B Chips, 1050mA Driver</td>
<td>347 347V</td>
<td>R3 Roadway Type III</td>
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<td>40BLEDE13 40B Chips, 1300mA Driver</td>
<td>480 480V</td>
<td>R4 Roadway Type IV</td>
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<td>40BLEDE15 40B Chips, 1500mA Driver</td>
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<td>R5 Roadway Type V</td>
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<td>60BLEDE70 60B Chips, 700mA Driver</td>
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<td>60BLEDE85 60B Chips, 850mA Driver</td>
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<td>60BLEDE13 60B Chips, 1300mA Driver</td>
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<td>80BLEDE15 80B Chips, 1500mA Driver</td>
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<table>
<thead>
<tr>
<th>Color Temperature (CCT)</th>
<th>Controls</th>
<th>Notes</th>
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<tbody>
<tr>
<td>(Blank) 4000K CCT, 70 CRI Min. (Standard)</td>
<td>3 Pin NEMA Photocontrol Receptacle (Standard)</td>
<td>1. Not available in 347 or 480V.</td>
</tr>
<tr>
<td>5K 5000K CCT, 70 CRI Min.</td>
<td>P5 5 Pin Photocontrol Receptacle (Dimmable Driver Included)</td>
<td>2. Not available with DM or ML options.</td>
</tr>
<tr>
<td>Paint</td>
<td>P7 7 Pin Photocontrol Receptacle (Dimmable Driver Included)</td>
<td>3. Not available with AO, DM, P5 or P7 options.</td>
</tr>
<tr>
<td>(Blank) Gray (Standard)</td>
<td>NR No Photocontrol Receptacle</td>
<td>4. Dimming schedule and light level information required from the customer in order to configure product. Contact Infrastructure Technical Support to proceed.</td>
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<tr>
<td>BK Black</td>
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<td>BZ Bronze</td>
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<td>DDB Dark Bronze</td>
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<td>GI Graphite</td>
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<td>WH White</td>
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<tr>
<th>Surge Protection</th>
<th>Controls</th>
<th>Notes</th>
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<td>(Blank) Standard 10kV/5kA SPD</td>
<td>3 Pin NEMA Photocontrol Receptacle (Standard)</td>
<td>1. Not available in 347 or 480V.</td>
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<td>20 20kV/10kA SPD</td>
<td>P5 5 Pin Photocontrol Receptacle (Dimmable Driver Included)</td>
<td>2. Not available with DM or ML options.</td>
</tr>
<tr>
<td>MP MOV Pack</td>
<td>P7 7 Pin Photocontrol Receptacle (Dimmable Driver Included)</td>
<td>3. Not available with AO, DM, P5 or P7 options.</td>
</tr>
<tr>
<td>IL SPD with Indicator Light</td>
<td>NR No Photocontrol Receptacle</td>
<td>4. Dimming schedule and light level information required from the customer in order to configure product. Contact Infrastructure Technical Support to proceed.</td>
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<table>
<thead>
<tr>
<th>Terminal Block</th>
<th>Controls</th>
<th>Notes</th>
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</thead>
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<td>(Blank) Terminal Block (Standard)</td>
<td>3 Pin NEMA Photocontrol Receptacle (Standard)</td>
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<td>T2 Wired to L1 &amp; L2 Positions</td>
<td>P5 5 Pin Photocontrol Receptacle (Dimmable Driver Included)</td>
<td>2. Not available with DM or ML options.</td>
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</table>

<table>
<thead>
<tr>
<th>Packaging</th>
<th>Notes</th>
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<tbody>
<tr>
<td>(Blank) Single Unit (Standard)</td>
<td>1. Not available in 347 or 480V.</td>
</tr>
<tr>
<td>JP Job Pack (24/Pallet)</td>
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</table>

<table>
<thead>
<tr>
<th>Misc</th>
<th>Notes</th>
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</thead>
<tbody>
<tr>
<td>BL External Bubble Level</td>
<td>1. Not available in 347 or 480V.</td>
</tr>
<tr>
<td>CR Enhanced Corrosion Resistant Finish</td>
<td>2. Not available with DM or ML options.</td>
</tr>
<tr>
<td>HS House-Side Shield</td>
<td>3. Not available with AO, DM, P5 or P7 options.</td>
</tr>
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<td>NL Nema Label</td>
<td>4. Dimming schedule and light level information required from the customer in order to configure product. Contact Infrastructure Technical Support to proceed.</td>
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<tr>
<td>XL Not CSA Certified</td>
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<tr>
<td>HK Hingekeepers</td>
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**Warranty**

Five-year limited warranty. Complete warranty terms located at: www.acuitybrands.com/Customer/Resources/Terms_and_conditions.aspx

Actual performance may differ as a result of end-user environment and application. All values are design or typical values, measured under laboratory conditions at 25°C. Specifications subject to change without notice.

**Please contact your sales representative for the latest product information.**
## Performance Package

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<th>Performance Package</th>
<th>Drive Current (mA)</th>
<th>Input Watts</th>
<th>Optic</th>
<th>4000K CCT</th>
<th>LLD @ 25°C</th>
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<td>Delivered Lumens</td>
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### Note:
Information shown above is based on nominal system data. Individual fixture performance may vary. Specifications subject to change without notice.

### ATB2 LLD Multiplier

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<th>Temperature</th>
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</thead>
<tbody>
<tr>
<td>Multiplier</td>
<td>1.02</td>
<td>1.01</td>
<td>1</td>
<td>0.99</td>
<td>0.97</td>
<td>0.96</td>
</tr>
</tbody>
</table>

To calculate the LLD for a temperature other than 25°C, multiply the LLD @ 25°C (shown in the performance package table) by the LLD multiplier for the selected temperature.

### Warranty
Five-year limited warranty. Complete warranty terms located at: [www.acuitybrands.com/CustomerResources/Terms_and_conditions.aspx](http://www.acuitybrands.com/CustomerResources/Terms_and_conditions.aspx). Actual performance may differ as a result of end-user environment and application. All values are design or typical values, measured under laboratory conditions at 25°C. Specifications subject to change without notice.

Please contact your sales representative for the latest product information.
The PLB series solar powered LED bollard is an ideal choice for low level architectural and commercial pathway and landscape lighting applications. Visual appeal combined with high quality construction and unequalled solar power performance make the PLB series an excellent fit where quality low level lighting is required.

Utilizing solar power and LED lighting the PLB bollards are fully self contained and offer significant benefits over typical wired bollards:

- Low installed costs and minimal site impacts with no trenching, cabling or wiring
- Minimal ongoing costs with no electricity bills or bulbs to change
- Immune from power outages
- Provide a visibly green statement with no ongoing carbon emissions

The performance of the PLB Series Solar LED Bollard is maximized through the use of proprietary Energy Management System (EMS) technology that allows the luminaire to function in harmony with its environment.

The EMS ensures that regardless of low-solar weather patterns or unusual charging conditions such as shading, the bollard continues to provide useable light that enhances the appeal and safety of the night time environment.

### TECHNICAL SPECIFICATIONS

**Solar Module:**
- High impact, UV resistant, polycarbonate encapsulation
- High-efficiency mono-crystalline cells
- Integrated into bollard housing
- Used for day/night detection (no photocell required)

**Energy Management System (EMS):**
- High efficiency Maximum Power Point Tracking (MPPT) charge controller
- Micro-controller based technology
- Includes high-efficiency LED driver
- Integrated into bollard housing
- Designed to automatically manage lighting performance based on environmental conditions and lighting requirements
- Patent pending

**Battery:**
- Pure lead, spiral wound, absorbed glass mat (AGM)
- Superior cyclic performance
- High temperature tolerance
- 10 year design life
-Contained within bollard post
- Simple battery changes when required

**LEDs and Optics:**
- Three high-output Cree LEDs
- 50,000 hour L70 lifetime
- Warm (3000K), neutral (4300K), cool (5500K) color temperatures available
- Type III and Type V high efficiency cut-off optics
- Typical lumen output of 130 lumens

**Mechanical Construction:**
- Cast, low copper aluminum housing
- Extruded, low copper aluminum post
- Stainless fasteners with security fastener option
- High strength mounting plate
- Architectural grade, super durable, TGIC powder coat with Alodine undercoat
- Four standard colors with custom colors available

**Factory Set Lighting Profiles:**
- On at dusk off at dawn
- On at dusk, turn off after 6 hours
- On at dusk, dim to 30% after 6 hours till dawn
- On at dusk, off after 5 hours, on 1 hour before dawn
- On at dusk, dim to 30% after 5 hours, on 1 hour before dawn
**PLB Series**

Solar Powered LED Bollard

**PHOTOMETRICS**

**ORDER MATRIX**

<table>
<thead>
<tr>
<th>Series</th>
<th>Height</th>
<th>Finish</th>
<th>Distribution</th>
<th>LED Color</th>
<th>Lighting Profile</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLB</td>
<td>101 - 14&quot;</td>
<td>BK - Black</td>
<td>ASM - Type III</td>
<td>30K - 3000K</td>
<td>00 - Dusk till dawn</td>
<td>WOB - Ship Without Battery</td>
</tr>
<tr>
<td></td>
<td>102 - 36&quot;</td>
<td>BZ - Bronze</td>
<td>SYM - Type V</td>
<td>43K - 4300K</td>
<td>01 - Dark +6 hours then off</td>
<td>SEC - Security Fasteners</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SV - Silver</td>
<td></td>
<td>55K - 5500K</td>
<td>02 - Dark +6 hours then 30% (DEFAULT)</td>
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<tr>
<td></td>
<td></td>
<td>WH - White</td>
<td></td>
<td>AMB - Amber</td>
<td>03 - Dark +5 hours, off, Dawn -1 hour</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>CC - Custom</td>
<td></td>
<td></td>
<td>04 - Dark +5 hours, 30%, Dawn -1 hour</td>
<td></td>
</tr>
</tbody>
</table>

Notes:
- Specifications subject to change without notice
- All light levels in foot candles (fc) with 4300K color temperature and 130 lumen output
- To convert to lux multiply light level by 10.7

First Light Technologies Ltd. | www.firstlighttechnologies.com | info@firstlighttechnologies.com | 250.590.5774

PLB: 70-0004 11/10/12

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**6" LED Open Downlight**

**RLF6LEDG4**

120V–277V  
0-10V Dimming

**APPLICATIONS:**

LiteFrame Retroficient RLF6LED is a 6" specification grade Retrofit LED retrofit downlight that combines superior brightness control with energy savings and low maintenance costs. The RLF6LED is designed specifically to retrofit into ceilings with existing recessed downlight fixtures without the need to remove the existing fixture. Suitable for a variety of commercial, retail, and institutional applications with ambient temperature up to 40°C (104°F) in open plenum applications.

**HOUSING:**

All components are made from quality die cast aluminum or galvaneal steel. Pre-wired j-box with snap-on cover for easy access. Snap-in connection from driver compartment allows easy installation of light engine/trim assembly without tools above or below the ceiling and can be upgraded to accommodate technology improvements. Approve for 8 (4 in/4 out) No. 12 AWG conductors rated for 90°C through wiring.

**INSTALLATION:**

All installation can be performed from below the ceiling without removing existing fixture.

**REFLECTOR:**


**LED LIGHT ENGINE:**

The RLF6LED uses the Philips Fortimo DLM Gen 4 LED Module with remote phosphor technology. This technology provides controlled color consistency (3 SCDM) from fixture to fixture. The system is designed for optional life and lumen maintenance (>30,000 hours at 70% lumen maintenance). Both reflector and light engine assembly are mechanically retained to housing. The light engine comes standard with 80 CRI in all Kelvin temperatures.

**LED DRIVER:**

The RLF6LED utilizes the Philips Fortimo LED Driver specifically designed to optimize efficiency of the Fortimo DDM Module. Driver is designed to match the 50,000 hour minimum life expectancy of the system. Meets UL Class 2, inherent short circuit protection, self-limited, overload protected. If critical temperatures are reached on driver or LED module, integrated thermal feedback loop will gradually reduce current to protect system life. Driver is universal 120V/277V. Optional Lutron Series A driver is also available.

**DIMMING:**

Comes standard with 0-10V dimming capability. Flicker-free dimming to 10%. 0-10V control may consume up to 1mA. 0-10V, Lutron 2 wire, 3 wire, and EcoSystem dimming available to 1%.

**CERTIFICATIONS:**

CSA certified to US and Canadian safety standards. Suitable for wet locations. Approved for through wiring. Non-IC rated. ENERGY STAR qualified with open clear Alzak reflector.

**WARRANTY:**

5 year warranty. See www.prescolite.com for details.

**CATALOG NUMBER:**

Order housing, reflector, and accessories separately

**HOUSING/LED VOLTAGE OPTIONS**

<table>
<thead>
<tr>
<th>HOUSING/LED VOLTAGE OPTIONS</th>
<th>TRIM</th>
<th>LED COLOR TEMP</th>
<th>REF. FINISH</th>
<th>LOWER REF. COLOR</th>
<th>ACCESSORIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>❑ RLF6LEDG4</td>
<td>❑ Blank</td>
<td>❑ 6LFLED5G4</td>
<td>❑ 30K</td>
<td>❑ Blank</td>
<td>❑ LFSC6</td>
</tr>
<tr>
<td>6&quot; High Efficency LED Housing</td>
<td>❑ Blank</td>
<td>❑ 6LFLED6G4</td>
<td>❑ 35K</td>
<td>❑ Semi-Diffuse</td>
<td>❑ LiteGear</td>
</tr>
<tr>
<td>120V–277V</td>
<td>❑ Blank</td>
<td>❑ 6LFLED7G4</td>
<td>❑ 40K</td>
<td>❑ Clear</td>
<td>❑ Retrofit wide diameter housing kit</td>
</tr>
<tr>
<td>❑ SD1</td>
<td>❑ 1100 Lumen Module</td>
<td>❑ CG</td>
<td>❑ Champagne Gold</td>
<td>❑ RWD6</td>
<td></td>
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<tr>
<td>❑ SD1</td>
<td>❑ 1500 Lumen Module</td>
<td>❑ BL</td>
<td>❑ Black</td>
<td></td>
<td></td>
</tr>
<tr>
<td>❑ SD1</td>
<td>❑ 2000 Lumen Module</td>
<td>❑ WE</td>
<td>❑ Wheat</td>
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</tr>
<tr>
<td>❑ SD1</td>
<td>❑ 2000 Lumen Module</td>
<td>❑ LW</td>
<td>❑ Light Wheat</td>
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<tr>
<td>❑ SD1</td>
<td>❑ 2000 Lumen Module</td>
<td>❑ PW</td>
<td>❑ Pewter</td>
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<td></td>
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<tr>
<td>❑ SD1</td>
<td>❑ 2000 Lumen Module</td>
<td>❑ WH</td>
<td>❑ White Paint</td>
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<td></td>
</tr>
</tbody>
</table>

**EXAMPLES:**

- RLF6LEDG4 - 6LFLED5G4 - 35K - White Trim
- RLF6LEDG4 - 6LFLED6G4 - 40K - Semi-Diffuse
- RLF6LEDG4 - 6LFLED7G4 - 40K - White Paint

**NOTES:**

1. See housing capability guide on page 3
2. Requires WT option also
3. For HDM, DM1, & 2DM options, housing output must match trim output

---

In a continuing effort to offer the best product possible we reserve the right to change, without notice, specifications or materials that in our opinion will not alter the function of the product. 
Web: www.prescolite.com Tech Support: (888) 777-4832
PHOTOMETRIC DATA

Retroficient - 6" RLF6LEDG4 Downlight

<table>
<thead>
<tr>
<th>DRIVER DATA</th>
<th>RLF6LED5G4 30K</th>
<th>RLF6LED7G4 30K</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input Voltage</td>
<td>120-277V</td>
<td>120-277V</td>
</tr>
<tr>
<td>Input Frequency</td>
<td>50/60 Hz</td>
<td>50/60 Hz</td>
</tr>
<tr>
<td>Input Current</td>
<td>0.12A (120v)</td>
<td>0.22A (120v)</td>
</tr>
<tr>
<td>Input Power</td>
<td>14.5W</td>
<td>26.5W</td>
</tr>
<tr>
<td>Constant Current Output</td>
<td>200-1000mA</td>
<td>200-1000mA</td>
</tr>
<tr>
<td>Power Factor</td>
<td>&gt;0.90</td>
<td>&gt;0.90</td>
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<tr>
<td>THD</td>
<td>&lt;20%</td>
<td>&lt;20%</td>
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<tr>
<td>EMI Filtering</td>
<td>FCC 47CFR</td>
<td>FCC 47CFR</td>
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<tr>
<td>Operating Temperature</td>
<td>-20°C to 40°C</td>
<td>-20°C to 40°C</td>
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<tr>
<td>Dimming</td>
<td>10-10V</td>
<td>0-10V</td>
</tr>
</tbody>
</table>

Over-voltage, over-current, short-circuit protected
*Power consumption and photometric output may vary slightly with HDMI or 20M driver

ZONAL LUMEN SUMMARY

<table>
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<tr>
<th>ZONE</th>
<th>LUMENS</th>
<th>%LUMINARIE</th>
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<tr>
<td>0-30</td>
<td>602</td>
<td>52.0</td>
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<tr>
<td>0-40</td>
<td>967</td>
<td>83.6</td>
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<td>0-60</td>
<td>1157</td>
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<tr>
<td>0-90</td>
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<tr>
<td>90-180</td>
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<td>0.0</td>
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<tr>
<td>0-180</td>
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LUMINANCE DATA IN CANDELA/SQ. METER

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<th>Angle in Vertical</th>
<th>Average</th>
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<td>18290</td>
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<tr>
<td>65°</td>
<td>382</td>
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COEFFICIENTS OF UTILIZATION

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<th>Zonal Cavity Method</th>
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<tr>
<td>% Effective Ceiling Cavity Reflectance</td>
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<tr>
<td>% Wall Reflectance</td>
</tr>
<tr>
<td>80%</td>
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<tr>
<td>70</td>
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<tr>
<td>70</td>
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</tr>
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</table>

Test No. 8458
Tested at 25°C Ambient in accordance to IESNA LM-79-2008

RLF6LEDG4 6FLFEDG4 30K

Test No. 8459
Tested at 25°C Ambient in accordance to IESNA LM-79-2008

Web: www.prescolite.com • Tech Support: (888) 777-4832
701 Millennium Boulevard • Greenville, SC 29607 U.S.A. • Phone (864) 678-1000
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Specifications subject to change without notice • Printed in U.S.A. • RTF-014 • 6/4/15

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**Central Inverters**

For fixture full light output in back-up mode, Prescolite and Dual-lite have jointly tested the LiteFrame LED with the 100 (LG1) and 250 (LG2) VA LiteGear inverters. (Note: Not for use with integral EM option). For more information on LiteGear go to www.dual-lite.com/resources/litegear_luminaire_loading_chart/

---

**Dimming Compatibility Table**

<table>
<thead>
<tr>
<th>Dimming Ballast</th>
<th>Manufacturer</th>
<th>Web Link</th>
</tr>
</thead>
</table>
FL57 SOLAR LED SIGN LIGHT SYSTEM (2 OR 3 FIXTURES)

BRAND: SOLAR ILLUMINATIONS
PRODUCT CODE: FL57
AVAILABILITY: IN STOCK

AVAILABLE OPTIONS
* Light Fixture Options:
  ○ 2 Lamp System
  ○ 3 Lamp System

* Solar Panel Power:
45 Watt  
70 Watt  
90 Watt  
100 Watt  
140 Watt

* Solar Charge Controller:

12/24V PWM 10A  
12/24V MPPT 10A

This sign light system is supplied with two LED sign light fixtures supplied with a built-on 9° extension arm and adjustable lamp. Ideal for various types of signs requiring lighting from above. Illumination can be set for dusk to dawn or timed mode. Supplied as a complete system including all necessary components such as solar panel, battery, and charge controller.

This system consists of two light fixtures which are fitted with an adjustable lamp which provides up to 30 degrees of movement. The lamp has 18 LEDs which emit 150 Lumens of warm white light. This system is designed to typically operate from dusk till dawn each night using two lights, and up to 12 hours using three. For installations in locations that experience harsh winter weather, or low sun levels, a higher powered solar panel and/or an MPPT charge controller may be required. Fully automatic activation at dusk. The installer can set the programmable charge controller to switch the system off after a chosen amount of hours or enable it to run from dusk to dawn. Several programmable timed options are available. An MPPT charge controller can be purchased as an optional upgrade. The MPPT charge controller improves solar charging efficiency, and offers addition light control features including a dual timer setting. Supplied with a 45W solar panel which can be installed on the sign structure or nearby. A weatherproof battery box is included to facilitate the sealed battery which is recharged daily via the solar panel. The light fixture simply plugs into the battery box and comes pre-wired with plenty of cord and fitted with simple connections. Color of the light fixture is silver. Color of other parts of the system are gray. Color of light output is warm white.
POPULAR USES

This light is perfect for illuminating various types of signs from above. Our solar LED sign light systems are perfect for sites where electricity is unavailable or where it would be too difficult or costly to install an electric supply. They are also suitable for retro-fit applications where electrically powered lights are being removed in an effort to save money and no longer use the utility supply.

TECHNICAL SPECIFICATIONS

Performance
Each lamp can illuminate a sign up to 4’ x 4’ (1.2m x 1.2m).
This system can typically operate dusk to dawn each night with two light fixtures, and up to 12 hours using three.
Up to 3 days of autonomy (subject to time length of night time illumination and other factors).

Light Fixture
Two or three light fixtures are included in this system.
The light is fitted with 18 SMD/LEDs.
Each light emits 150 Lumens.
**LED beam angle is approx. 60 degrees.**
Warm white LED color temperature approx. 2700k.
The light is fitted with approximately 10’ 10’ (3m) of pre-wired cable which is pre-plugged ready for easy connection to the battery box.
Additional extension cable is available (upon request) as an option.
The light fixture is weather rated to IP 65.
Lamp section dimensions 13.5” long x .5” wide (34cm x 1.5cm).
The extension arm is 9” long and 1.5” wide (23cm x 14cm).

Battery
Two 12 Volt 12 Amp-Hr sealed lead acid batteries are supplied.
Battery type is AGM. Gel battery is available by special order.

Battery Box
A plastic weatherproof battery box is supplied to accommodate the battery.
The battery box has a removable front which is lockable (padlock not included).
The battery box also houses the charge controller.
The battery box is approx. 10.5” x 8” x 5” (27cm x 20cm x 12cm) LxWxD.

Solar Panel
High quality, aluminium framed, powerful 45 Watt solar panel is included.
Higher powered solar panel options may be available. For help determining whether a solar panel upgrade is

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necessary, please contact our customer service department.
Solar panel is supplied with approximately 18’ (5.5m) of cable/cord. Additional cord is available as an optional extra.
The solar panel cord connects directly to the battery box.
The solar panel support is supplied with a fold-out 'U' shape bracket which can be used to mount it to a suitable surface.
The 45W solar panel dimensions approx. 34.25” x 20.13” x 1.5” (86.8cm x 51cm x 3.5cm) LxWxD.

**Control Module**
This system includes a programmable control module which regulates and manages the solar panel power, battery power, and illumination time. The compact control module has LED indicators to display status, and houses connections for solar panel, batteries, and lamp. User programmable illumination time of up to 1 to 12 hours or dusk-to-dawn setting (where conditions permit). User or installer can set the control module to run from dusk and then shut off after a certain amount of hours. Default setting is typically dusk to dawn. Instructions are supplied should the user or installer need to program or re-program the module*. An option to upgrade to an MPPT charge controller is available. The MPPT charge controller improves solar charging efficiency by up to 30%. The MPPT charge controller also offers the most advanced load control options and intelligent battery life management.

**Installation**
All connections are simply plug & play.

---

### REMARKS

20 year solar panel warranty, 5 year warranty on all other components (excluding batteries). Batteries are covered by the manufacturer.* Warranty registration is required (after purchase), otherwise a base one year warranty will apply. Go to www.solarilluminations.com/registration to register your warranty. Lifetime unlimited technical support.

Please Note: This product is a special order and is non-returnable except in the event of a fault (during its warranty period) when the product, once returned will be repaired or replaced.

The solar panel must be installed in a location where it can receive full direct sunshine (when available) and usually set facing South at an appropriate angle (where adjustment options allow). The solar panel must not be installed in a shaded or part shaded location and never indoors. The standard specifications of the system (particularly the solar panel Wattage and battery capacity) may need to be adjusted. These components are determined by your geographic location, power consumption (LED Wattage) and the total amount of hours of illumination time required. Such changes to the standard specifications may increase or decrease the cost shown. Please contact us for more information or assistance. The illumination time is estimated and subject to various factors including (but not limited to) geographic location, seasons, temperature, weather conditions & location of product etc. The illumination time of most solar lights can reduce during winter months when the
weather is poor and the days are shorter. During this time insolation hours decrease accordingly. Shorter illumination time due to one or more of the above factors does not define the product as being ‘defective’ or ‘not as described’. All solar lights must be used in a completely dark location at night time otherwise they may not illuminate. Nearby strong lighting sources or ambient lighting may affect the operation of a solar light. This does not define the product as being ‘defective’ or ‘not as described’. Please note, if you do not install or use this product for several months the battery may discharge naturally on its own. By allowing a battery to deep discharge it may cause irreversible damage as the battery may then lose the ability to recharge or hold a full charge. Although unlikely, we reserve the right to supply this product with any minor alterations or minor changes to the specifications (shown above by text description or by photographs) due to different supplies or product batches received, incorporating such product changes made by the manufacturer, without further notice. Descriptions, specifications and photographs are updated regularly but may not be current when minor changes to a product have only recently been made.
* View our Terms, Conditions and Polices (including our Returns Policy) for further information.

**SPECIFICATION**

<table>
<thead>
<tr>
<th>SOLAR LIGHTS DATA</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Lumen Output</td>
<td>150 Lumens per lamp.</td>
</tr>
<tr>
<td>Equivalent Incandescent Wattage</td>
<td>Approx. 25 Watts per lamp.</td>
</tr>
<tr>
<td>Approximate Illumination Time</td>
<td>Typically dusk to dawn.</td>
</tr>
<tr>
<td>Approximate Sign Size</td>
<td>Up to 4’ x 4’ (1.2m x 1.2m)</td>
</tr>
<tr>
<td>Solar Panel Wattage</td>
<td>From 45 Watts.</td>
</tr>
<tr>
<td>Programable Controller</td>
<td>Yes.</td>
</tr>
</tbody>
</table>

**TAGS:**

Tags: FL57, Sign Light, Above Sign
A: Main Parking
B: Storage Area
C: Makai Pier
D: Mauka Pier – (DoD Restricted)

Suggested waypoint
Regular survey route
As necessary route
Seabird Monitoring Routes in Public Access and Secure Areas of Lihue Airport

Lihue Airport (4065-01)
December 2018

Legend

Public Access Areas

- A: Rental Car Lots
- B: Main Terminal Exterior
- C: Public Parking
- D: Employee Parking Lot
- G: Cargo Parking Lot
- I: Aukini Rd Public Access Areas
- H: Maintenance Compound

Secure Aircraft Operations Areas (AOA)

- Heliport Secure Area
- Main Apron/Ramp
- Main Cargo Apron/Ramp
- Taxiway and Runway
- Perimeter Grass Fields and Fenceline Road
- WS survey route
- HTIH survey route

N:\Projects4000\4065-01\Reports\Fig 1 USDA Wildlife Services Lihue 2018.mxd
Seabird Monitoring – Primary Data Form  
Hawaii Department of Transportation

Please complete ALL fields on this data sheet during each monitoring period. Additional comments and descriptive information MUST be entered on the Supplemental Information Form.

Survey Location ______________________________________________________

Date __________________________ Start Time ___________ End Time ___________

Observer Name ______________________________________________________

Weather conditions __________________________________________________

<table>
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<th>Time of discovery</th>
<th>Condition</th>
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<td>Longitude</td>
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</tbody>
</table>

**ID#:** This will be the observer’s initials followed by date and number in sequence of specimens discovered (example: GS100217-01 corresponding with "your initials", October 2, 2017 number 1).

**Survey Location:** Lihue Airport (LIH), Nawiliwili Harbor (NAW), Port Allen Harbor (PA), Kahului Airport (OGG), Kahului Harbor (KAH), and Lanai Airport (LAN).

**Weather conditions** MUST include wind speed and direction, percent cloud cover, and precipitation (none, drizzle, continuous or intermittent rain).

**Condition:** Alive (A), Injured (I), Dead (D); **Distance:** The linear distance (in meters) to the nearest source of artificial light, overhead structure, or significant feature; **Type:** Overhead light including the number of lamps (e.g. OL-6), shipping container (SC), building (B), fence (Fe), powerline (PL), or other (OTH) and include a description on the Supplemental Information Form.
## HDOT 2017  Downed Wildlife Incident

### Reporting Form

<table>
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<tr>
<th>Date</th>
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<td>Time Agency Responders Arrive/Advise</td>
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<td>GPS Coordinates</td>
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<td>Distance of bird to base of nearest light (m)</td>
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<td>Bearing from base of nearest light (deg)</td>
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<td>Ground Type (paved, grass, shrub, other)</td>
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<td>Wind Direction and Speed (mph)</td>
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<td>Temperature (°F if known)</td>
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<td>Photos taken¹ (circle one)</td>
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¹ All photos are assigned an ID# and are recorded in the Photo Log.
## Descriptive Information

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<th>Sequence of Response Measures:</th>
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## Additional Comments

Attach 2-3 photos to this report.
Seabird Monitoring – Supplemental Information Form

Hawaii Department of Transportation

Survey Location __________________________  Date _______________________

Observer Name _______________________________________________________

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<thead>
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All photos MUST be entered in the Photo Log.
Seabird Monitoring – Species Names and Acronym Codes  
Hawaii Department of Transportation

Please use the following codes for grounded bird species recorded on the Primary Data Form. If a species is encountered which does not occur on this list, please record the common name.

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<td>Band-rumped Storm-Petrel</td>
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<tr>
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Appendix C. Results of Searcher Efficiency Trials at Nawiliwili Harbor and Port Allen Harbor, Kauai, 2017
Searcher Efficiency Trials at Nawiliwili Harbor and Port Allen Harbor, Kauai.

Sampling structure and results of detection efficiency trials conducted at Nawiliwili Harbor and Port Allen, Kauai, in December 2017

All carcasses retrieved at the conclusion of trials were delivered to the Kauai Humane Society and Save Our Shearwaters program for storage and later disposal.

Prepared by H. T. Harvey & Associates. Preliminary results, subject to further analysis and reporting.

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<th>Port Allen</th>
<th>Carcass ID</th>
<th>Map Point</th>
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<th>Coordinates</th>
<th>Trial #</th>
<th>Finder 1</th>
<th>Finder 2</th>
<th>Found</th>
<th>Comments</th>
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Summary of Findings

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**Summary of Findings**

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Appendix D. Summary of 2017 Seabird Monitoring Results at Hawaii Department of Transportation Facilities on Kauai
Summary of Seabird Monitoring Results at Hawaii
Department of Transportation Facilities, Kauai, 2017
Period Covered: September 24, 2017 - December 15, 2017
Prepared by H. T. Harvey & Associates

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<th>Species</th>
<th>Time</th>
<th>Condition</th>
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<td>A</td>
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<td>WTSH</td>
<td>20:10</td>
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<td>13-Nov</td>
<td>NAW</td>
<td>WTSH</td>
<td>20:50</td>
<td>A</td>
</tr>
<tr>
<td>15-Nov</td>
<td>NAW</td>
<td>WTSH</td>
<td>18:50</td>
<td>A</td>
</tr>
<tr>
<td>16-Nov</td>
<td>NAW</td>
<td>WTSH</td>
<td>21:20</td>
<td>D</td>
</tr>
<tr>
<td>16-Nov</td>
<td>NAW</td>
<td>STPE †</td>
<td>16:21</td>
<td>D</td>
</tr>
<tr>
<td>19-Nov</td>
<td>NAW</td>
<td>HAPE</td>
<td>21:15</td>
<td>A</td>
</tr>
<tr>
<td>20-Nov</td>
<td>NAW</td>
<td>WTSH</td>
<td>20:15</td>
<td>A</td>
</tr>
<tr>
<td>1-Dec</td>
<td>NAW</td>
<td>WTSH</td>
<td>20:40</td>
<td>A</td>
</tr>
</tbody>
</table>

* Presumed NESH; only part of wing and a few loose feathers found (post-scavenging).
† Heavy salt encrusting on carcass suggests bird was exposed to spray aboard the Pride of America prior to deposition at Nawiliwili Harbor and not attributed to HDOT; possibly Band-rumped storm petrel.

No downed birds discovered
Appendix E. FallOut Records for Covered Seabirds at Hawaii Department of Transportation Facilities on Kauai, 2013-2017
<table>
<thead>
<tr>
<th>ID</th>
<th>LogDate</th>
<th>LogType</th>
<th>Species</th>
<th>Status</th>
<th>PermBand</th>
<th>LocationFound</th>
<th>AidStation</th>
<th>Section</th>
<th>AgeClass</th>
<th>Port Allen HDOT</th>
<th>Nawiliwili HDOT</th>
<th>LIH HDOT</th>
</tr>
</thead>
<tbody>
<tr>
<td>MLP011</td>
<td>10/12/2013</td>
<td>Aid Station</td>
<td>NESH</td>
<td>REL</td>
<td>1054-27392</td>
<td>Taxiway A @ Taxiway L intersection (airport)</td>
<td>Lihue Airport</td>
<td>11</td>
<td>HY</td>
<td>NESH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>JMG010</td>
<td>10/15/2013</td>
<td>Aid Station</td>
<td>NESH</td>
<td>REL</td>
<td>1064-00594</td>
<td>Matson, vicinity of gate 14 located in the young brothers shipyard. Bird found sitting on the pavement.</td>
<td>Matson</td>
<td>13</td>
<td>HY</td>
<td></td>
<td>NESH</td>
<td></td>
</tr>
<tr>
<td>JMO018</td>
<td>10/30/2013</td>
<td>Aid Station</td>
<td>NESH</td>
<td>REL</td>
<td>1054-27461</td>
<td>Nawiliwili Harbor</td>
<td>Lihue Fire Station</td>
<td>13</td>
<td>HY</td>
<td>NESH</td>
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<td></td>
</tr>
<tr>
<td>MLP026</td>
<td>10/31/2013</td>
<td>Aid Station</td>
<td>NESH</td>
<td>REL</td>
<td>1054-31632</td>
<td>Between commuter terminal and grassy area near storm drain. Airport</td>
<td>Lihue Airport</td>
<td>11</td>
<td>HY</td>
<td>NESH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MK409</td>
<td>10/16/2014</td>
<td>Aid Station</td>
<td>NESH</td>
<td>REL</td>
<td>1064-00757</td>
<td>Port Allen Pier</td>
<td>Hanapepe Fire Station</td>
<td>21</td>
<td>HY</td>
<td>NESH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CMD032</td>
<td>10/28/2014</td>
<td>Aid Station</td>
<td>NESH</td>
<td>REL</td>
<td>1064-00934</td>
<td>Found outside Terminal Building</td>
<td>Matson</td>
<td>13</td>
<td>HY</td>
<td>NESH</td>
<td></td>
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<tr>
<td>ELC025</td>
<td>11/16/2014</td>
<td>Secondary Pickup</td>
<td>NESH</td>
<td>DOA</td>
<td></td>
<td>&quot;Young Brothers, Pier 3, #15 pole, 11/15/2014, (Matson)&quot;</td>
<td>OTHER</td>
<td>13</td>
<td>U</td>
<td>NESH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MJ183</td>
<td>10/7/2015</td>
<td>Aid Station</td>
<td>NESH</td>
<td>REL</td>
<td>1064-01072</td>
<td>Hanapepe Harbor, near pier</td>
<td>Kalaheo Fire Station</td>
<td>21</td>
<td>HY</td>
<td>NESH</td>
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<tr>
<td>JS002</td>
<td>10/10/2015</td>
<td>Aid Station</td>
<td>NESH</td>
<td>REL</td>
<td>1064-01185</td>
<td>Port Allen Pier roadside, 3:30 pm</td>
<td>Hanapepe Fire Station</td>
<td>21</td>
<td>HY</td>
<td>NESH</td>
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<tr>
<td>TA423</td>
<td>10/13/2015</td>
<td>Aid Station</td>
<td>NESH</td>
<td>REL</td>
<td>1064-01076</td>
<td>Front of Matson Building, 3rd door @ 20:30</td>
<td>Matson</td>
<td>13</td>
<td>HY</td>
<td>NESH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NS012</td>
<td>10/14/2015</td>
<td>Aid Station</td>
<td>NESH</td>
<td>REL</td>
<td>1064-01096</td>
<td>&quot;Port Allen on the pier 8:15&quot;</td>
<td>Kalaheo Fire Station</td>
<td>21</td>
<td>HY</td>
<td>NESH</td>
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<tr>
<td>NS020</td>
<td>10/19/2015</td>
<td>Aid Station</td>
<td>NESH</td>
<td>REL</td>
<td>1064-01172</td>
<td>&quot;Port Allen DOT pier&quot;</td>
<td>Hanapepe Fire Station</td>
<td>21</td>
<td>HY</td>
<td>NESH</td>
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<tr>
<td>NS024</td>
<td>10/20/2015</td>
<td>Aid Station</td>
<td>NESH</td>
<td>REL</td>
<td>0864-06001</td>
<td>&quot;Port Allen pier&quot;</td>
<td>Kalaheo Fire Station</td>
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<td>HY</td>
<td>NESH</td>
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<tr>
<td>TA432</td>
<td>10/22/2015</td>
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<td>NESH</td>
<td>REL</td>
<td>0864-06014</td>
<td>Tiger Pier @ 9pm 10/21/15</td>
<td>Matson</td>
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<tr>
<td>UMP170</td>
<td>10/28/2016</td>
<td>Aid Station</td>
<td>NESH</td>
<td>REL</td>
<td>1064-02129</td>
<td>Holo Holo Charters, Port Allen Commercial Pier 17:20 10/27</td>
<td>Hanapepe Fire Station</td>
<td>21-PA</td>
<td>HY</td>
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### HDOT Monitoring Program Results for 2017

<table>
<thead>
<tr>
<th>ID</th>
<th>LogDate</th>
<th>LogType</th>
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<th>PermBand</th>
<th>LocationFound</th>
<th>AidStation</th>
<th>Section</th>
<th>AgeClass</th>
<th>Port Allen HDOT</th>
<th>Nawiliwili HDOT</th>
<th>LIH HDOT</th>
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</thead>
<tbody>
<tr>
<td>HTHarvey</td>
<td>10/12/2017</td>
<td>Monitoring</td>
<td>NESH</td>
<td>Alive</td>
<td>?</td>
<td>Nawiliwili Harbor</td>
<td>?</td>
<td>13</td>
<td>HY</td>
<td>NESH</td>
<td></td>
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<tr>
<td>HTHarvey</td>
<td>10/13/2017</td>
<td>Monitoring</td>
<td>NESH</td>
<td>Alive</td>
<td>?</td>
<td>Lihue Airport</td>
<td>?</td>
<td>11</td>
<td>HY</td>
<td>NESH</td>
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<tr>
<td>HTHarvey</td>
<td>10/26/2017</td>
<td>Monitoring</td>
<td>NESH</td>
<td>Dead</td>
<td>?</td>
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<td>?</td>
<td>11</td>
<td>HY</td>
<td>NESH</td>
<td></td>
<td></td>
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<tr>
<td>HTHarvey</td>
<td>10/26/2017</td>
<td>Monitoring</td>
<td>NESH</td>
<td>Alive</td>
<td>?</td>
<td>Lihue Airport</td>
<td>?</td>
<td>11</td>
<td>HY</td>
<td>NESH</td>
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<tr>
<td>HTHarvey</td>
<td>11/4/2017</td>
<td>Monitoring</td>
<td>NESH</td>
<td>Dead</td>
<td>?</td>
<td>Lihue Airport</td>
<td>?</td>
<td>11</td>
<td>U</td>
<td>NESH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HTHarvey</td>
<td>11/19/2017</td>
<td>Monitoring</td>
<td>HAPE</td>
<td>Alive</td>
<td>?</td>
<td>Nawiliwili Harbor</td>
<td>?</td>
<td>13</td>
<td>HY</td>
<td>HAPE</td>
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### SOS Monitoring Results (New) for 2017

<table>
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<tr>
<th>SOS New</th>
<th>LogDate</th>
<th>Location</th>
<th>Species</th>
<th>Status</th>
<th>PermBand</th>
<th>LocationDescription</th>
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<th>AgeClass</th>
<th>Port Allen HDOT</th>
<th>Nawiliwili HDOT</th>
<th>LIH HDOT</th>
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<tbody>
<tr>
<td>SOS New</td>
<td>11/17/2017</td>
<td>11-Lihue-Airport Area</td>
<td>NESH</td>
<td>Alive</td>
<td></td>
<td>Lihue Airport</td>
<td>11</td>
<td>NESH</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>SOS New</td>
<td>11/17/2017</td>
<td>11-Lihue-Airport Area</td>
<td>NESH</td>
<td>Alive</td>
<td></td>
<td>Lihue Airport</td>
<td>11</td>
<td>NESH</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>SOS New</td>
<td>10/14/2017</td>
<td>13-Matson/ Nawiliwili Harbor</td>
<td>NESH</td>
<td>Alive</td>
<td>Matson Container near wht tent area @ 2357 10/13</td>
<td>13</td>
<td>NESH</td>
<td></td>
<td></td>
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<tr>
<td>SOS New</td>
<td>10/26/2017</td>
<td>13-Matson/ Nawiliwili Harbor</td>
<td>NESH</td>
<td>Alive</td>
<td>Pier 1 Apron @ 816 on 10/26</td>
<td>13</td>
<td>NESH</td>
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<tr>
<td>SOS New</td>
<td>10/14/2017</td>
<td>21-Port Allen</td>
<td>NESH</td>
<td>Alive</td>
<td>Port Allen Pier</td>
<td>21</td>
<td>NESH</td>
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<tr>
<td>SOS New</td>
<td>10/22/2017</td>
<td>21-Port Allen</td>
<td>NESH</td>
<td>Alive</td>
<td>Port Allen Pier</td>
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<td>NESH</td>
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</tr>
<tr>
<td>SOS New</td>
<td>10/23/2017</td>
<td>21-Port Allen</td>
<td>NESH</td>
<td>Alive</td>
<td>Port Allen Pier about 0830. Found struggling in water by Holo Holo trying to get onto pier.</td>
<td>21</td>
<td>NESH</td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

**Total Period 2013 - 2017 - NESH**
- 10
- 9
- 8

**Total Period 2013 - 2017 - HAPE**
- 0
- 1
- 0

**Annual Average 2013-2017 - NESH**
- 10
- 9
- 8

**15 Year HAPE Fallout Records**
- HAPE Fallout Record 2003
- HAPE Fallout Record 2004
- HAPE Fallout Record 2007
- 1
- 1
<table>
<thead>
<tr>
<th>Event</th>
<th>HAPE Fallout Record 2008</th>
<th>HAPE Fallout Record 2012</th>
<th>HAPE Fallout Record 2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 year total (2003-2017)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>15 year Annual Average (2003-2017)</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
</tr>
</tbody>
</table>

^Note: Assume the HAPE fallout in 2003, 2008 occurred at Nawiliwili, pending further data.

<table>
<thead>
<tr>
<th>Event</th>
<th>BSRP Fallout Record 2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 year total (2003-2017)</td>
<td>1</td>
</tr>
<tr>
<td>15 year average (2003-2017)</td>
<td>0.07</td>
</tr>
</tbody>
</table>
Program Overview:
The seabird monitoring program at Lihue Airport in 2017 was a multi-entity, collaborative effort involving USDA Wildlife Services (WS), H. T. Harvey & Associates, and Hawaii Department of Transportation (HDOT) airport operations staff, airport security, and tenants. WS has been implementing a comprehensive wildlife hazard management program at the airport for decades, which involves detecting, managing, and controlling all wildlife hazards to aircraft operations. As a part of this program, WS specifically takes actions to monitor for seabird fallout during the September 15–December 15 fallout season, including detection of, response to, and providing care for downed seabirds at the airport. WS also controls barn owls (Tyto alba) and feral cats, which are potential predators of downed seabirds. In addition to the ongoing WS program, H. T. Harvey & Associates was also contracted by HDOT in 2017 to conduct a monitoring program for downed seabirds at the airport, focusing on areas under the control of HDOT that have external lighting which may attract seabirds. H. T. Harvey & Associates monitoring staff conducted surveys from September 24 through December 15, 2017. These combined efforts were supplemented by the collective efforts and contribution of HDOT airport operations staff, airport security, and airport tenants (e.g., airlines, rental car agency employees) who were requested to be alert to the annual seabird fallout situation, and assist with detection and response. These entities shared the common interests of ensuring aircraft and public safety and protecting downed seabirds. They contributed a large number of additional personnel who were working and moving throughout the airport, watching for and reporting the presence of downed seabirds and any other aircraft operating hazards on a daily and nightly basis.

Program Overview:
The seabird monitoring program at Nawiliwili Harbor in 2017 was a multi-entity, collaborative effort including H. T. Harvey & Associates, HDOT harbor operations staff, HDOT harbor security, and tenants. The program included monitoring for downed seabirds during the seabird fallout season, with HDOT operations and security staff conducting surveillance from September 15 through December 15, 2017. H. T. Harvey & Associates monitoring staff conducted surveys from September 24 through December 15, 2017. H. T. Harvey & Associates staff led the coordination and reporting efforts of the seabird monitoring program; however, their work was greatly supported and enhanced by HDOT security, HDOT harbor operations staff, and tenants, including Young Brothers and Matson shipping lines personnel. During hours when H. T. Harvey & Associates monitoring staff were not present, HDOT harbor security responded to instances of downed seabirds, provided care, and reported incidents to H. T. Harvey & Associates and harbor operations staff. The HDOT operations staff and tenants were also aware of the seabird fallout situation, and shared the common interests of ensuring workplace safety and protecting downed seabirds. These supporting entities contributed a large number of additional personnel who were watching for the presence of downed seabirds and any other workplace hazards on a daily and nightly basis.

<table>
<thead>
<tr>
<th>Seabird Monitoring Program at Lihue Airport 2017</th>
<th>Seabird Monitoring Program at Nawiliwili Harbor 2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>The seabird monitoring program at Lihue Airport in 2017 was a multi-entity, collaborative effort involving USDA Wildlife Services (WS), H. T. Harvey &amp; Associates, and Hawaii Department of Transportation (HDOT) airport operations staff, airport security, and tenants. WS has been implementing a comprehensive wildlife hazard management program at the airport for decades, which involves detecting, managing, and controlling all wildlife hazards to aircraft operations. As a part of this program, WS specifically takes actions to monitor for seabird fallout during the September 15–December 15 fallout season, including detection of, response to, and providing care for downed seabirds at the airport. WS also controls barn owls (Tyto alba) and feral cats, which are potential predators of downed seabirds. In addition to the ongoing WS program, H. T. Harvey &amp; Associates was also contracted by HDOT in 2017 to conduct a monitoring program for downed seabirds at the airport, focusing on areas under the control of HDOT that have external lighting which may attract seabirds. H. T. Harvey &amp; Associates monitoring staff conducted surveys from September 24 through December 15, 2017. These combined efforts were supplemented by the collective efforts and contribution of HDOT airport operations staff, airport security, and airport tenants (e.g., airlines, rental car agency employees) who were requested to be alert to the annual seabird fallout situation, and assist with detection and response. These entities shared the common interests of ensuring aircraft and public safety and protecting downed seabirds. They contributed a large number of additional personnel who were working and moving throughout the airport, watching for and reporting the presence of downed seabirds and any other aircraft operating hazards on a daily and nightly basis.</td>
<td>The seabird monitoring program at Nawiliwili Harbor in 2017 was a multi-entity, collaborative effort involving H. T. Harvey &amp; Associates, HDOT harbor operations staff, HDOT harbor security, and tenants. The program included monitoring for downed seabirds during the seabird fallout season, with HDOT operations and security staff conducting surveillance from September 15 through December 15, 2017. H. T. Harvey &amp; Associates monitoring staff conducted surveys from September 24 through December 15, 2017. H. T. Harvey &amp; Associates staff led the coordination and reporting efforts of the seabird monitoring program; however, their work was greatly supported and enhanced by HDOT security, HDOT harbor operations staff, and tenants, including Young Brothers and Matson shipping lines personnel. During hours when H. T. Harvey &amp; Associates monitoring staff were not present, HDOT harbor security responded to instances of downed seabirds, provided care, and reported incidents to H. T. Harvey &amp; Associates and harbor operations staff. The HDOT operations staff and tenants were also aware of the seabird fallout situation, and shared the common interests of ensuring workplace safety and protecting downed seabirds. These supporting entities contributed a large number of additional personnel who were watching for the presence of downed seabirds and any other workplace hazards on a daily and nightly basis.</td>
</tr>
<tr>
<td><strong>Seabird Monitoring Program at Lihue Airport 2017</strong></td>
<td><strong>Seabird Monitoring Program at Nawiliwili Harbor 2017</strong></td>
</tr>
<tr>
<td>-----------------------------------------------------</td>
<td>------------------------------------------------------------</td>
</tr>
<tr>
<td>The seabird monitoring program at Lihue Airport included the following components.</td>
<td>The seabird monitoring program at Nawiliwili Harbor included the following components.</td>
</tr>
<tr>
<td>a. WS staff(^1). Daily and nightly surveys and patrols of secure areas of the airport within the perimeter fence and aircraft movement area, plus twice daily morning and afternoon, patrols of perimeters and public access areas of the airport, and responses to calls for assistance anywhere on the airport. Their primary focus was managing wildlife hazards, and their responsibilities included active searches, detection, control, and reporting of wildlife hazards, with an emphasis on downed seabirds detection, response and rescue during the annual fallout season. They rescued live downed birds, recovered dead birds, and reported incidents to airport operations and regulatory agencies; live birds were sent to the Kauai Save Our Shearwaters (SOS) program. WS staff also provided seabird awareness and response training to other airport staff and tenants. WS also conducted routine trapping of feral cats at Lihue Airport year-round, and trapped for mongoose in response to sightings.</td>
<td>a. H. T. Harvey &amp; Associates staff(^2). H. T. Harvey &amp; Associates monitoring staff conducted nightly surveys of the harbor, including container yards, piers, freight staging and storage areas, warehouses, access roads, vehicle and machinery lots, and around buildings and other facility structures. Their responsibilities included active searches, detection, rescue, and reporting of downed seabirds. They rescued live downed birds, recovered dead birds, and reported incidents to Harbor Security and the Kauai SOS program. H. T. Harvey &amp; Associates monitoring staff also provided seabird awareness and response information to harbor staff and tenants.</td>
</tr>
<tr>
<td>b. HDOT airport operations staff(^3). They conducted daily and nightly patrols of secure and public areas of the airport. Their patrols in the secure areas of the airport primarily focused on the paved aircraft movement areas, including runways, taxiways, and main terminal and cargo aprons. They also patrolled other areas of the airfield and public access areas, including perimeter fences, public access roads, parking lots, and airport tenant lots. Their responsibilities included searching for hazards (including hazardous wildlife) in the active aircraft movement areas, with an emphasis on downed seabirds during annual fallout season. They detected and reported downed seabirds to WS, and sought assistance to rescue live birds and retrieve or recover dead birds.</td>
<td>b. HDOT harbor operations staff(^4). Harbors operation staff conducted patrols of secure areas of harbor Monday through Friday. Their responsibilities included inspecting equipment, looking for hazards in the container yard, including the presence of downed wildlife, with an emphasis on downed seabirds during the annual fallout season. They detected downed birds and notified HDOT harbor security and H.T. Harvey &amp; Associates monitoring staff.</td>
</tr>
</tbody>
</table>

---

\(^1\) Information on WS staff activities provided by Bill Bukoski, Kauai Supervisor, USDA Aphis Wildlife Services, Lihue. (pers. comm. 12/4/2018)

\(^2\) Information on H. T. Harvey & Associates staff activities provided by Greg Spencer, Monitoring Program Supervisor. (pers. comm. 11/4/2018)

\(^3\) Information on airport operations staff activities provided by Christian Galicia, Airport Operations Controller, Lihue, Kauai. (pers. comm. 12/5/2018)

\(^4\) Information on harbor operations staff activities provided by Robert Crowell, Nawiliwili Harbor Master, Lihue, Kauai. (pers. comm. 12/5/2018)
### Seabird Monitoring Program at Lihue Airport 2017

| c. | HDOT airport security. They conducted daily and nightly surveys and patrolled public access areas of the airport, including access roads, public parking lots, terminals, and airport buildings. |
| d. | Airport tenants in the aircraft movement area. This group included staff of airlines, air cargo services, and helicopter services. These personnel, who worked day and night in secure areas of the airport and were alerted to detect and report any downed seabirds to security or WS. |
| e. | Airport tenants in public access areas. This group included airport rental car companies, air cargo companies, and aircraft support companies. The rental car companies had a large number of staff that worked day and night, and managed their own lots. They reported downed seabirds to airport security or WS. |
| f. | H. T. Harvey & Associates. The monitoring staff conducted nightly surveys of the main lighted portions of the aircraft movement areas, as well as the public access areas of the airport. Their responsibilities included active searches, detection, rescue, and reporting of downed seabirds during annual fallout season. They rescued live downed birds, recovered dead birds, and reported incidents to WS, regulatory agencies, and the Kauai SOS program. They also provided seabird awareness and response training to airport staff and tenants. |

### Seabird Monitoring Program at Nawiliwili Harbor 2017

| c. | HDOT harbor security. They completed daily and nightly surveys and patrolled secure parts of the harbor, including terminals, the container yard, buildings, and roadways. |
| d. | Harbor tenants. This group included staff of Matson and Young Brothers shipping lines, and cruise lines. These companies had staff who worked regular scheduled days, sometimes during nighttime hours, in the secure areas of the harbor. They were alerted to detect and report any downed seabirds to security or H. T. Harvey & Associates monitoring staff. Cruise lines had their own procedures for documenting and accounting for incidents onboard their ships and additionally reported to harbor operations. |

### Seabird species monitored

| a. | The seabirds covered in the monitoring program are the Newell's shearwater (Puffinus newelli), Hawaiian petrel (Pterodroma sandwichensis), band-rumped storm-petrel (Oceanodroma castro), and wedge-tailed shearwater (Ardenna pacifica). |

### Percentage of total property and total area that were searched

| a. | WS staff covered 100% of the fenced secure area of the airport, including the taxiways, runways, grass fields, perimeter road and fence, main passenger and cargo terminals, aircraft parking aprons, ramps, and aircraft and helicopter maintenance areas. |

---

5 Information on airport security staff activities provided by Patti Espacio, Securitas Administrative Assistant, Lihue. Kauai. (pers. comm. 12/5/2018)

6 Information on harbor security staff activities provided by Robert Crowell, Nawiliwili Harbor Master, Lihue. Kauai. (pers. comm. 12/5/2018)
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<td>inside the perimeter fence. They also provided coverage of the public access areas of the airport, including the main access roads, Ahukini Road, parking lots, and most tenant lots (Figure 1). They completed regular searches for downed seabirds or other wildlife that posed a hazard to aviation. WS staff typically drove through the search areas, and conducted pedestrian surveys in lighted and poorly-lit areas that were not visible from a vehicle.</td>
<td>container yards; auto yard; and internal access roads within the fenced harbor compound (Figure 2). The monitors surveyed each pier on foot, and also conducted vehicular surveys by driving slowly along the access roads between the main piers and container yards.</td>
</tr>
<tr>
<td>b. HDOT airport operations staff covered 100% of the airport and had daily rounds that encompassed both the secure and public access areas of the airport. The areas that were checked included the paved aircraft movement areas, taxiways, runways, aircraft parking aprons, passenger and cargo terminals, and maintenance areas. They also completed rounds of the perimeter grass fields and fencelines. The public access areas that were covered included main roads, tenant lots, and public and employee parking areas. Airport operations staff typically drove their rounds multiple times a day to search for anything that posed a hazard to aviation, including downed seabirds. Staff investigated and removed any hazard on the airfield, and notified WS if a downed seabird was detected.</td>
<td>b. HDOT harbor operations staff covered 100% of the fenced secure areas of the harbor and public access areas of the facility. These areas included the harbor administration compound; Piers 1, 2 and 3; harbor terminals; warehouses; container yards; auto yard; and internal access roads within the fenced harbor compound. The harbor operations staff typically drove their rounds once a day to search for potential hazards to harbor operations, including downed seabirds.</td>
</tr>
<tr>
<td>c. HDOT airport security covered 100% of the public access areas of the airport and staffed entry gates to the secure portions of airfield. The public access parts of the airport included access roads, public parking lots, access road for rental car facilities, and public access portions of terminals and airport buildings. Airport security staff typically drove their rounds to search for security risks, including downed seabirds; they reported downed seabirds to WS.</td>
<td>c. HDOT harbor security covered 100% of the fenced secure areas of the harbor and public access areas of the facility by doing hourly rounds for 24 hours per day. These areas included the harbor administration compound; Piers 1, 2 and 3; harbor terminals; warehouses; container yards; auto yard; and internal access roads within the fenced harbor compound. They also drove the outside perimeter fence once per shift. During their hourly rounds, the harbor security staff searched for hazards to harbor operations, including downed seabirds. Harbor security typically searched for security risks from a slow-moving vehicle, and responded to and rescued any downed seabirds that were detected.</td>
</tr>
<tr>
<td>d. H. T. Harvey &amp; Associates staff conducted the 2017 surveys on foot inside the secure area of the airport that covered the taxiway and aircraft parking apron adjacent to the main terminal, interisland terminal, cargo terminal, and helicopter maintenance areas (Figure 1). They searched the public access road, public parking lots, passenger pickup and drop-off portions of terminals and airport buildings on foot. The monitoring staff also</td>
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<tr>
<td>searched from a vehicle by driving slowly along the access roads between the main lighted areas.</td>
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<tr>
<td>4. Frequency of searches</td>
<td>4. Frequency of searches</td>
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<tr>
<td>a. WS staff, who ran three shifts per day, conducted searches of the secure portions of the airfield throughout the day, beginning at the start of their shifts and continuing multiple times per shift. The last round of searches was conducted at the end of the night shift (10:00–11:00 p.m.). During their numerous searches, WS staff looked for wildlife hazards and downed seabirds, particularly when aircraft were scheduled to arrive or depart, detecting, responding to, rescuing, and reporting downed seabirds. WS staff conducted rounds of the public access areas of the airport at least twice per day, typically in the morning and late afternoon. They inspected wildlife traps and searched for wildlife hazards, including downed seabirds.</td>
<td>a. H. T. Harvey &amp; Associates staff conducted one nightly search of the harbor facility that consisted of approximately 1–2 hours of on-site surveillance.</td>
</tr>
<tr>
<td>b. HDOT airport operations staff ran three shifts per day and conducted rounds and searches of the secure portions of the airport a minimum of twice per day; once at 10:00 a.m., and again typically around 10:00 p.m. The staff also conducted rounds of the public access areas of the airport twice per day in the morning and afternoon.</td>
<td>b. HDOT harbor operations staff conducted rounds of the secure areas of the harbor 1 or 2 times per day, Monday through Friday, to detect any operational hazards including detecting and reporting downed seabirds.</td>
</tr>
<tr>
<td>c. HDOT airport security staff ran three shifts per day and conducted hourly rounds of the public access areas of the airport throughout the day and night. The security staff drove the public access roads in the airport, public parking lots, and public access areas to terminals and airport buildings to inspect for security risks, and detected and reported downed seabirds.</td>
<td>c. HDOT harbor security conducted hourly rounds of the harbor throughout the day and night. Security staff drove the roadways and yards within the harbor fenced areas. They also patrolled the public access areas of the facility, including the outer perimeters, inspecting for security risks, and detected and responded to downed seabirds.</td>
</tr>
<tr>
<td>d. H. T. Harvey &amp; Associates staff conducted one nightly search, which consisted of approximately 2–3 hours of on-site surveillance, of the secure and public access areas of the airport.</td>
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<tr>
<td>5. Time of day of searches</td>
<td>5. Time of day of searches</td>
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<tr>
<td>a. WS staff conducted searches of the secure area of the airport multiple times throughout the day and night, beginning with the morning shift between 5:15–5:45 a.m., and ending with the night shift from 10:00–11:00 p.m. The staff conducted searches on a roughly hourly basis, particularly when aircraft were scheduled to arrive or depart. WS staff conducted rounds of the public access areas of the airport at least twice per day, typically in the morning and late afternoon.</td>
<td>a. H. T. Harvey &amp; Associates staff conducted a nightly search of the harbor in the evening between 7:00–11:00 p.m.</td>
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<td>a. WS staff ran three shifts per day, and each shift typically consisted of one staff person who conducted airport rounds and searches for downed seabirds and other wildlife hazards.</td>
</tr>
<tr>
<td>b. HDOT airport operations staff ran three shifts per day, and each shift consisted of one staff person who conducted airport rounds and searched for downed seabirds and other wildlife hazards.</td>
</tr>
<tr>
<td>c. HDOT airport security staff ran three shifts per day, and each shift consisted of at least 2-3 security personnel on hourly rounds of the public access areas of the airport throughout the day and night.</td>
</tr>
<tr>
<td>d. Airport tenants in aircraft movement area. Airline employees were active on the apron throughout the day and during evening operating hours. There were approximately 50-100 personnel on the main terminal apron, main cargo terminal apron, and helicopter heliport apron and maintenance areas. These personnel were aware of seabird fallout issues and were watching for downed seabirds or other wildlife hazards to aircraft operations.</td>
</tr>
<tr>
<td>e. Airport tenants in public access areas. Car rental agency employees were walking and driving through car rental lots on a daily and nightly basis. Airport maintenance staff worked in public access areas during airport operating hours and were walking and driving through parking areas and public access areas.</td>
</tr>
<tr>
<td>f. H. T. Harvey &amp; Associates' surveys typically entailed having one searcher cover the airport; however, two searchers were...</td>
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### Seabird Monitoring Program at Nawiliwili Harbor 2017

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<td>a. H. T. Harvey &amp; Associates surveys of the harbor were conducted by one staff person.</td>
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<tr>
<td>b. HDOT harbor operations searches were completed by one staff person, who conducted harbor rounds and searched for operational hazards, including downed seabirds.</td>
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<td>c. HDOT harbor security conducted hourly rounds with one staff person throughout the day and night.</td>
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<tr>
<td>d. Harbor tenants. Matson and Young Brothers cargo shipping lines had employees on duty at the harbor unloading and loading cargo whenever one of their cargo ship was in port. There were approximately 25-30 personnel moving cargo around the pier and container yard during operations. These personnel were aware of seabird fallout issues, and were watching for operational hazards, including downed seabirds.</td>
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occasionally used to cover both the secure aircraft movement area and public access areas.

7. Data Collection and Reporting
   a. WS staff maintained a daily log of survey activity, including downed bird searches or general survey rounds. Information on downed seabirds was recorded on a Threatened & Endangered (T&E) Species Recovery Report Form, including information on species, date, time, location, condition of bird, circumstances, name and contact number of the person who found it, and photographs. The completed T&E Species Recovery Report Forms were used to report incidents to H. T. Harvey & Associates, HDOT, the Kauai SOS program, and regulatory agencies.

   b. H. T. Harvey & Associates staff recorded daily field notes and documented their daily survey efforts. The data collected included the observer name, survey date, survey start and end times, survey location, weather conditions, and information about any birds that were discovered. The data consisted of bird ID#, time of discovery, species, location (including GPS coordinates), condition (i.e., alive, injured, injured, or dead), characteristics of nearby lighting, and the distance to lights or nearby structures. These observations were compiled in a spreadsheet. A downed wildlife report form was completed and used to report incidents to WS, HDOT, the Kauai SOS program, and regulatory agencies.

8. Training
   a. WS staff provided annual seabird fallout awareness training and briefings to HDOT staff, airport security, and airport tenants. Airport tenants were asked to contact security or WS staff if downed seabirds were detected. Security were asked to forward reports of downed seabirds to WS to respond directly. If airport security responded, they were asked to turn over any rescued live birds or recovered dead birds to WS.

   b. H. T. Harvey & Associates provided seabird awareness fact sheets to airport staff, security, and tenants.
Figure 1. Seabird Monitoring Routes in Public Access and Secure Areas of Lihue Airport

Figure 1 USDA Wildlife Services Lihue 2017.mxd

Legend

Public Access Areas

- B: Main Terminal Exterior
- C: Public Parking
- D: Employee Parking Lot
- G: Cargo Parking Lot
- H: Maintenance Compound
- I: Aukini Rd Public Access Areas

Secure Aircraft Operations Areas (AOA)

- Heliport Secure Area
- Main Apron/Ramp
- Main Cargo Apron/Ramp
- Taxiway and Runway
- Perimeter Grass Fields and Fenceline Road
- WS survey route
- HTH survey route

N:\Projects4000\4065-01\Reports\Fig 1 USDA Wildlife Services Lihue 2017.mxd
Figure 2. Nawiliwili Harbor Seabird Monitoring Survey Routes

Legend
- A: Matson & Rental Car Storage
- B: Administrative Buildings
- C: Matson

Regular survey route
As necessary route

Legend
- D: Pier 2 - Cruise Ship exclusion zone
- E: Young Brothers

Suggested waypoint
Kaua‘i Seabird Habitat Conservation Program (KSHCP)

Participant Inclusion Plan (PIP)

Name of Applicant/Participant
Alexander & Baldwin, Inc.
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Wainiha Powerhouse

(i) Wainiha Powerhouse - TMK Map .................................................................A-25
(i) Wainiha Powerhouse - Site Plan .................................................................A-26

Hokulei Shopping Village

(j) Hokulei Shopping Village - TMK Map (1 of 6) .................................................A-27
(j) Hokulei Shopping Village - TMK Map (2 of 6) .................................................A-28
(j) Hokulei Shopping Village - TMK Map (3 of 6) .................................................A-29
(j) Hokulei Shopping Village - TMK Map (4 of 6) .................................................A-30
(j) Hokulei Shopping Village - TMK Map (5 of 6) .................................................A-31
(j) Hokulei Shopping Village - TMK Map (6 of 6) .................................................A-32
(j) Hokulei Shopping Village - Site Plan (1 of 2) ..................................................A-33
(j) Hokulei Shopping Village - Site Plan (2 of 2) ..................................................A-34

Shops at Kukuiula

(k) Shops at Kukuiula - TMK Map .................................................................A-35
(k) Shops at Kukuiula - Site Plan (1 of 2) ..........................................................A-36
(k) Shops at Kukuiula - Site Plan (2 of 2) ..........................................................A-37

Waipouli Town Center

(l) Waipouli Town Center - TMK Map ..........................................................A-38
(l) Waipouli Town Center - Site Plan (1 of 2) ...................................................A-39
(l) Waipouli Town Center - Site Plan (2 of 2) ...................................................A-40

Kukui‘ula Development (Plantation Core/The Club)

(m) Kukui‘ula Development (Plantation Core/The Club) - TMK Map ..........A-41
(m) Kukui‘ula Development (Plantation Core/The Club) - Site Plan ..........A-42

Appendix B1 – Seabird Awareness and Response Training Program (Commercial Properties)

Appendix B2 – Seabird Awareness and Response Training Program (McBryde Facilities)
Appendix C – Standard Operating Procedures
Appendix D – A&B Downed Seabird Recovery Report Form
PART 1: Landowner & Property Information; Description of the Facilities; Avoidance & Minimization Measures; Monitoring of Take

Item 1. Provide the name of the landowner, business, agency, or institution and complete contact information. If the applicant/participant is different from the landowner, please attach power of attorney (or other documentation) allowing the party to act on the landowner’s behalf.

Participant/Applicant Name: Alexander & Baldwin, Inc.  
(including its subsidiaries/related entities:  
A & B Properties Hawaii, LLC  
Alexander & Baldwin, LLC  
McBryde Sugar Company, LLC  
McBryde Resources, Inc.  
ABP LR1 LLC  
ABP LR2 LLC  
ABP LR3 LLC  
Kukui’ula Village LLC  
ABP Waipouli LLC  
KDC, LLC  
Kukui’ula Development Company (Hawaii), LLC)

Physical Address/Location of Facility: Various (see Item 2)

Mailing Address: 822 Bishop Street  
Honolulu, HI 96813

Primary Contact: Ownership Name: Sean M. O'Keefe  
Address: PO Box 266  
Puunene, HI 96784

Email: sokeefe@abhi.com  
Telephone: (808) 283-8907

Alternate Contact: Name: Nelson Chun  
Address: 822 Bishop Street  
Honolulu, HI 96813
<table>
<thead>
<tr>
<th>Preparer Contact:</th>
<th>Name:</th>
<th>Lisa A. Bail, Esq.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Address:</td>
<td>Goodsell Anderson Quinn &amp; Stifel LLP</td>
</tr>
<tr>
<td></td>
<td></td>
<td>999 Bishop St., Suite 1600</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Honolulu, HI 96813</td>
</tr>
<tr>
<td></td>
<td>Email:</td>
<td><a href="mailto:lbail@goodsill.com">lbail@goodsill.com</a></td>
</tr>
<tr>
<td></td>
<td>Telephone:</td>
<td>(808) 547-5787</td>
</tr>
<tr>
<td>Preparer Contact:</td>
<td>Name:</td>
<td>Reginald David</td>
</tr>
<tr>
<td></td>
<td>Address:</td>
<td>Rana Biological Consulting, Inc.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P.O. Box 1371</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Kailua-Kona, HI 96740</td>
</tr>
<tr>
<td></td>
<td>Email:</td>
<td><a href="mailto:davidr003@hawaii.rr.com">davidr003@hawaii.rr.com</a></td>
</tr>
<tr>
<td></td>
<td>Telephone:</td>
<td>(808) 937-0124</td>
</tr>
</tbody>
</table>
Item 2. Provide the legal description of the property at which the existing facilities and Covered Activities are located, including Tax Map Key (TMK) number. Provide a survey of the property and site plan drawings showing the locations of the Covered Activities (lights), property boundaries, buildings & structures, and site features. If properties containing the Covered Activities comprise separate parcels please include all Tax Map Key numbers and maps.

The following A&B facilities are proposed for inclusion. Copies of the TMK maps and site plans for the properties below are included in Appendix A. Lighting information is indicated in Tables 1(a) through 1(m) below.

<table>
<thead>
<tr>
<th>Property Name/Description</th>
<th>Owner</th>
<th>TMK Number</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Port Allen Solar Farm (solar power array) McBryde Resources, Inc. operator</td>
<td>McBryde Sugar Company LLC</td>
<td>(4) 2-1-001:051</td>
<td>20 acres</td>
</tr>
<tr>
<td>b. Port Allen Center I and II (commercial/warehouse facilities)</td>
<td>A &amp; B Properties Hawaii, LLC</td>
<td>(4) 2-1-003:004</td>
<td>2.67 acres</td>
</tr>
<tr>
<td>c. Port Allen south parcels</td>
<td>A &amp; B Properties Hawaii, LLC</td>
<td>(4) 2-1-003:029 (BEI parcel)</td>
<td>0.813 acres</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(4) 2-1-003:030 (shore parcel)</td>
<td>1.283 acres</td>
</tr>
<tr>
<td>d. Port Allen parking lots</td>
<td>Alexander &amp; Baldwin LLC</td>
<td>(4) 2-1-003:025</td>
<td>0.6614 acres</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(4) 2-1-003:026</td>
<td>1.2618 acres</td>
</tr>
<tr>
<td>e. Port Allen Steel Warehouse (commercial/warehouse facilities)</td>
<td>A &amp; B Properties Hawaii, LLC</td>
<td>(4) 2-1-003:028</td>
<td>3.598 acres</td>
</tr>
<tr>
<td>f. Port Allen Marina Center (commercial/retail center)</td>
<td>A &amp; B Properties Hawaii, LLC</td>
<td>(4) 2-1-003:040</td>
<td>1.71 acres</td>
</tr>
<tr>
<td>g. Pump 3 Hanapepe Valley (irrigation pump station) McBryde Resources, Inc. operator</td>
<td>McBryde Sugar Company, LLC</td>
<td>(4) 2-1-001:010 (portion)</td>
<td>0.45 acres (of 123.0683 acres)</td>
</tr>
<tr>
<td>h. Kalaheo Powerhouse (hydroelectric plant) McBryde Resources, Inc. operator</td>
<td>McBryde Sugar Company, LLC</td>
<td>(4) 2-4-016:013 portion</td>
<td>0.6 acres (of 48.064 acres)</td>
</tr>
<tr>
<td>i. Wainiha Powerhouse (hydroelectric plant) McBryde Resources, Inc. operator</td>
<td>McBryde Sugar Company LLC</td>
<td>(4) 5-8-003:003 portion</td>
<td>1.5 acres (of 30.87 acres)</td>
</tr>
</tbody>
</table>
This Participant Inclusion Plan uses the foregoing letter identifications to reference the above properties throughout this document. For example, the Port Allen Solar Farm will be referenced in Table 1(a), 2(a), 3(a), etc. and Kukui’ula Development will be referenced in Table 1(m), 2(m), 3(m), etc.

**Item 3. Describe the existing Covered Activities for which incidental take authorization is sought.** Include list of buildings, type and description of lights present, purpose and location of lights and current seabird lighting accommodation in place (e.g. shielding, downward pointing, switched off during fledging season etc.). For “Types of lights” please use the following categories:

- Parking Lights
- Signage Illumination
- Wall-pack Building Lights
- Landscaping/Grounds/Accent/Bollards
- Indoor lights visible from outdoors
- Roof Floodlights
- Other Lights

Facility lighting plan may be submitted as lighting inventory. Photos may be attached. The suggested light table, and Green Sea Turtle assessment table below may each be modified as needed to provide the necessary information.

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Company</th>
<th>Parcel Numbers</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>j</td>
<td>Hokulei Shopping Village (shopping center)</td>
<td>ABP LR1 LLC, ABP LR2 LLC, ABP LR3 LLC</td>
<td>(4) 3-3-003:046, 049, 050, 051, 052, 053</td>
<td>14.598</td>
</tr>
<tr>
<td>k</td>
<td>The Shops at Kukui’ula (retail center)</td>
<td>Kukui’ula Village LLC</td>
<td>(4) 2-6-015:010</td>
<td>10.241</td>
</tr>
<tr>
<td>l</td>
<td>Waipouli Town Center, Kapaa (shopping center)</td>
<td>ABP Waipouli LLC</td>
<td>(4) 4-3-008:002</td>
<td>4.267</td>
</tr>
<tr>
<td>m</td>
<td>Kukui’ula Development (Plantation Core/The Club)</td>
<td>KDC, LLC</td>
<td>(4) 2-6-019:031 (Plantation Core)</td>
<td>15.264</td>
</tr>
</tbody>
</table>
## Table 1(a): Lighting at Port Allen Solar Farm

<table>
<thead>
<tr>
<th>List of Buildings</th>
<th>Type/Description of Lights Present</th>
<th>Location</th>
<th>Purpose of the Lights</th>
<th>Describe any measures implemented to avoid or minimize take impacts to Covered Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control building</td>
<td>Fully shielded down pointed over door LED lights</td>
<td>Over two doors on the exterior of the building</td>
<td>Safety if an emergency occurs at night and service access is required</td>
<td>Both lights are fully dark sky compliant and lights are not illuminated except when a night time service call is required</td>
</tr>
</tbody>
</table>
Port Allen Solar Farm

Table 2(a): Green Sea Turtle Assessment for Port Allen Solar Farm

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are any of the facilities located adjacent to a beach?</td>
<td>Yes</td>
<td>If yes, provide length of beach frontage &amp; brief description of facilities &amp; lights adjacent to the beach.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>This parcel includes about 60 feet of beach frontage. The solar facility itself is at least 300 feet from the beach, and there are no lights on the beach. The only lights at this facility are about 1,000 feet from the beach (and are normally off).</td>
</tr>
<tr>
<td>Are any of the Covered Activities (lights) visible from a beach?</td>
<td>A&amp;B's lights are not visible from the beach.</td>
<td>If yes, describe the specific lights (type, height, purpose) &amp; specific location; provide map &amp; photos showing distance from beach</td>
</tr>
<tr>
<td>Have green sea turtles been known to nest on any beaches adjacent to the facilities?</td>
<td>No</td>
<td>If yes, provide information about nesting occurrences, if known, including location and date and any other information</td>
</tr>
<tr>
<td>List of Buildings</td>
<td>Type/Description of Lights Present</td>
<td>Location</td>
</tr>
<tr>
<td>------------------</td>
<td>-----------------------------------</td>
<td>----------</td>
</tr>
<tr>
<td>Port Allen Center 1: One warehouse split into six bays, fronting Waialo Road, totaling 28,000 sq. ft.</td>
<td>12 flat LED panel lights</td>
<td>Mounted on steel building pointed down and shielded</td>
</tr>
<tr>
<td></td>
<td>4 fully shielded cylinder lights</td>
<td>Mounted on steel building pointed down and shielded</td>
</tr>
<tr>
<td></td>
<td>2 large fully shielded lights</td>
<td>On either side of the Brew Pub entrance</td>
</tr>
<tr>
<td></td>
<td>Eight fixtures of various types which have been deactivated</td>
<td>Back side of the building</td>
</tr>
<tr>
<td>Port Allen Center 2: One warehouse split into seven bays, totaling 13,198 sq. ft.</td>
<td>3 flat low wattage LED panels mounted so that they point straight down</td>
<td>On west facing wall overlooking the parking lot</td>
</tr>
<tr>
<td></td>
<td>1 bare bulb floods with two lights each</td>
<td>On west facing wall overlooking the parking lot</td>
</tr>
<tr>
<td>Damage Type</td>
<td>Location Description</td>
<td>Safety and Security Notes</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-----------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>I motion triggered flat LED fixture</td>
<td>On west facing wall overlooking the parking lot</td>
<td>Safety and security</td>
</tr>
<tr>
<td>3 bare bulbs</td>
<td>One on the back of the building and two by NAPA</td>
<td>Safety and security, only used occasionally businesses are not open at night</td>
</tr>
</tbody>
</table>
Port Allen Center I and II

Table 2(b): Green Sea Turtle Assessment for Port Allen Center I and II

Please provide the information requested below to help determine if measures to avoid impacts to the Green Sea Turtle(s) from the effects of light attraction are required to be implemented at any of the facility(s), parcel(s), or site(s) included in this PIP. Please consult with staff from the DLNR and the USFWS to arrange a site visit, if needed, discuss measures to avoid impacts to the Green Sea Turtle, and provide further guidance.

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes/No</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are any of the facilities located adjacent to a beach?</td>
<td>No</td>
<td>If yes, provide length of beach frontage &amp; brief description of facilities &amp; lights adjacent to the beach</td>
</tr>
<tr>
<td>Are any of the Covered Activities (lights) visible from a beach?</td>
<td>No</td>
<td>If yes, describe the specific lights (type, height, purpose) &amp; specific location; provide map &amp; photos showing distance from beach</td>
</tr>
<tr>
<td>Have green sea turtles been known to nest on any beaches adjacent to the facilities?</td>
<td>No</td>
<td>If yes, provide information about nesting occurrences, if known, including location and date and any other information</td>
</tr>
</tbody>
</table>
### Port Allen South Parcels

**Table 1(c): Lighting at Port Allen South Parcels**

<table>
<thead>
<tr>
<th>List of Buildings</th>
<th>Type/Description of Lights Present</th>
<th>Location</th>
<th>Purpose of the Lights</th>
<th>Describe any measures implemented to avoid or minimize take impacts to Covered Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vacant Shoreline Parcel - none</td>
<td>None</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>BEI Parcel – two buildings, plus a shipping container converted to a building</td>
<td>1 flat flood light</td>
<td>Mounted on power pole</td>
<td>Light is no longer functional</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 unshielded streetlight, deactivated</td>
<td>In yard</td>
<td>Light is no longer functional</td>
<td></td>
</tr>
</tbody>
</table>
Table 2(c): Green Sea Turtle Assessment for Port Allen South Parcels

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are any of the facilities located adjacent to a beach?</td>
<td>No</td>
<td>If yes, provide length of beach frontage &amp; brief description of facilities &amp; lights adjacent to the beach</td>
</tr>
<tr>
<td>The vacant lot is adjacent to the shoreline but has no &quot;facilities&quot; other than a fuel pipeline operated by Island Energy Services</td>
<td></td>
<td>The vacant lot fronts the ocean. There are approximately 600 feet of shoreline frontage and no lights adjacent to the shoreline. There is no beach; the shoreline is a rock cliff</td>
</tr>
<tr>
<td>Are any of the Covered Activities (lights) visible from a beach?</td>
<td>No</td>
<td>If yes, describe the specific lights (type, height, purpose) &amp; specific location; provide map &amp; photos showing distance from beach</td>
</tr>
<tr>
<td>Have green sea turtles been known to nest on any beaches adjacent to the facilities?</td>
<td>No</td>
<td>If yes, provide information about nesting occurrences, if known, including location and date and any other information</td>
</tr>
</tbody>
</table>
Port Allen Parking Lots
Table 1(d): Lighting at Port Allen Parking Lots

<table>
<thead>
<tr>
<th>List of Buildings</th>
<th>Type/Description of Lights Present</th>
<th>Location</th>
<th>Purpose of the Lights</th>
<th>Describe any measures implemented to avoid or minimize take impacts to Covered Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>None – unpaved parking lot located ocean side of the Marina Center</td>
<td>Three LED fully shielded streetlights</td>
<td>Fronting Aka Ula Road <em>makai</em> of the Marina Center</td>
<td>Safety and security</td>
<td>Selected fully shielded streetlights – there are regular streetlights along Waialo Road which are operated by KIUC</td>
</tr>
</tbody>
</table>
Port Allen Parking Lots

Table 2(d): Green Sea Turtle Assessment for Port Allen Parking Lots

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are any of the facilities located adjacent to a beach?</td>
<td>No (there is shoreline frontage, but no beach).</td>
<td>If yes, provide length of beach frontage &amp; brief description of facilities &amp; lights adjacent to the beach. There are approximately 300 feet of shoreline frontage and no lights adjacent to the shoreline. There is no beach; the shoreline is rocky.</td>
</tr>
<tr>
<td>Are any of the Covered Activities (lights) visible from a beach?</td>
<td>No</td>
<td>If yes, describe the specific lights (type, height, purpose) &amp; specific location; provide map &amp; photos showing distance from beach. A&amp;B lighting is inland of the Navy and HDOT-DOT lighting.</td>
</tr>
<tr>
<td>Have green sea turtles been known to nest on any beaches adjacent to the facilities?</td>
<td>No</td>
<td>If yes, provide information about nesting occurrences, if known, including location and date and any other information.</td>
</tr>
</tbody>
</table>
### Port Allen Steel Warehouse

#### Table 1(e): Lighting at Port Allen Steel Warehouse

<table>
<thead>
<tr>
<th>List of Buildings</th>
<th>Type/Description of Lights Present</th>
<th>Location</th>
<th>Purpose of the Lights</th>
<th>Describe any measures implemented to avoid or minimize take impacts to Covered Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>One Steel warehouse building divided into seven bays totally 22,622 sq. ft.</td>
<td>Seven rectangular wall sconces with foil shield</td>
<td>Attached to the building sides</td>
<td>Safety and security</td>
<td>Most of these fixtures are no longer functional</td>
</tr>
<tr>
<td>&quot;</td>
<td>Six motion sensor activated LED panels</td>
<td>Attached to the building sides</td>
<td>Safety and security</td>
<td>Lights turn on only when someone approaches the building and turn off when they leave</td>
</tr>
<tr>
<td>&quot;</td>
<td>Four double bulb flood lights</td>
<td>Attached to building</td>
<td>Safety and security</td>
<td>These are no longer active</td>
</tr>
<tr>
<td>&quot;</td>
<td>Two downward pointed floods triggered by motion sensors</td>
<td>Attached to building</td>
<td>Safety and security</td>
<td>Lights turn on only when someone approaches the building and turn off when they leave</td>
</tr>
<tr>
<td>&quot;</td>
<td>Five other non-shielded fixtures</td>
<td>Attached to building</td>
<td>No longer in use</td>
<td>These fixtures have been deactivated, and will be removed</td>
</tr>
</tbody>
</table>
Port Allen Steel Warehouse  

Table 2(e): Green Sea Turtle Assessment for Port Allen Steel Warehouse

Please provide the information requested below to help determine if measures to avoid impacts to the Green Sea Turtle(s) from the effects of light attraction are required to be implemented at any of the facility(s), parcel(s), or site(s) included in this PIP. Please consult with staff from the DLNR and the USFWS to arrange a site visit, if needed, discuss measures to avoid impacts to the Green Sea Turtle, and provide further guidance.

<table>
<thead>
<tr>
<th>Question</th>
<th>Response</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are any of the facilities located adjacent to a beach?</td>
<td>No (there is shoreline frontage, but no beach)</td>
<td>If yes, provide length of beach frontage &amp; brief description of facilities &amp; lights adjacent to the beach. This property fronts the ocean. There are approximately 400 feet of shoreline frontage and no lights on the makai side of the building, and all other lights on the building are motion sensor triggered. There is no beach; the shoreline is rocky.</td>
</tr>
<tr>
<td>Are any of the Covered Activities (lights) visible from a beach?</td>
<td>No</td>
<td>If yes, describe the specific lights (type, height, purpose) &amp; specific location; provide map &amp; photos showing distance from beach</td>
</tr>
<tr>
<td>Have green sea turtles been known to nest on any beaches adjacent to the facilities?</td>
<td>No</td>
<td>If yes, provide information about nesting occurrences, if known, including location and date and any other information</td>
</tr>
</tbody>
</table>
### Port Allen Marina Center

**Table 1(f): Lighting at Port Allen Marina Center**

<table>
<thead>
<tr>
<th>List of Buildings</th>
<th>Type/Description of Lights Present</th>
<th>Location</th>
<th>Purpose of the Lights</th>
<th>Describe any measures implemented to avoid or minimize take impacts to Covered Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two buildings connected by a courtyard</td>
<td>56 Low wattage wall sconces</td>
<td>Attached to the walls of the buildings under an overhang</td>
<td>Security and safety</td>
<td>The wattage of the bulbs has been lowered as much as they can be and still provide adequate lighting for shoppers. During the fledging season every other light is turned off at 9:00 pm.</td>
</tr>
<tr>
<td>&quot;</td>
<td>Ten fully shielded down pointing streetlights</td>
<td>Located in the parking lots and along the front of the shopping center</td>
<td>Security and safety</td>
<td></td>
</tr>
<tr>
<td>&quot;</td>
<td>Eight fluorescent signage illuminators, completely shielded by metal shielding</td>
<td>On the front of the building lighting individual store signs</td>
<td>Illuminate shop signs</td>
<td></td>
</tr>
<tr>
<td>&quot;</td>
<td>Two CFL floods</td>
<td>Pointed at the entrance to the bar. Under the eaves of the building</td>
<td>Illuminate bar entrance</td>
<td></td>
</tr>
</tbody>
</table>
### Port Allen Marina Center

**Table 2(f): Green Sea Turtle Assessment for Port Allen Marina Center**

Please provide the information requested below to help determine if measures to avoid impacts to the Green Sea Turtle(s) from the effects of light attraction are required to be implemented at any of the facility(s), parcel(s), or site(s) included in this PIP. Please consult with staff from the DLNR and the USFWS to arrange a site visit, if needed, discuss measures to avoid impacts to the Green Sea Turtle, and provide further guidance.

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
<th>Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are any of the facilities located adjacent to a beach?</td>
<td>No</td>
<td>If yes, provide length of beach frontage &amp; brief description of facilities &amp; lights adjacent to the beach</td>
</tr>
<tr>
<td>Are any of the Covered Activities (lights) visible from a beach?</td>
<td>No</td>
<td>If yes, describe the specific lights (type, height, purpose) &amp; specific location; provide map &amp; photos showing distance from beach</td>
</tr>
<tr>
<td>Have green sea turtles been known to nest on any beaches adjacent to the facilities?</td>
<td>No</td>
<td>If yes, provide information about nesting occurrences, if known, including location and date and any other information</td>
</tr>
</tbody>
</table>
### Pump 3 Hanapepe Valley

**Table 1(g): Lighting at Pump 3 Hanapepe Valley**

<table>
<thead>
<tr>
<th>List of Buildings</th>
<th>Type/Description of Lights Present</th>
<th>Location</th>
<th>Purpose of the Lights</th>
<th>Describe any measures implemented to avoid or minimize take impacts to Covered Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control building</td>
<td>One deactivated light</td>
<td>Over door into the control building</td>
<td>Nighttime emergency service calls</td>
<td>These lights are no longer functional.</td>
</tr>
<tr>
<td>Pump shed</td>
<td>Two unshielded flood lights</td>
<td>Lighting the pumps</td>
<td>Nighttime emergency service calls</td>
<td>These lights are not turned on unless there is an emergency repair needed at night. Also, they are located under an open-sided roofed structure.</td>
</tr>
<tr>
<td>Switching yard</td>
<td>None</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Pump 3 Hanapepe Valley

Table 2(g): Green Sea Turtle Assessment for Pump 3 Hanapepe Valley

Please provide the information requested below to help determine if measures to avoid impacts to the Green Sea Turtle(s) from the effects of light attraction are required to be implemented at any of the facility(s), parcel(s), or site(s) included in this PIP. Please consult with staff from the DLNR and the USFWS to arrange a site visit, if needed, discuss measures to avoid impacts to the Green Sea Turtle, and provide further guidance.

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
<th>If yes, provide information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are any of the facilities located adjacent to a beach?</td>
<td></td>
<td>No</td>
<td>If yes, provide length of beach frontage &amp; brief description of facilities &amp; lights adjacent to the beach</td>
</tr>
<tr>
<td>Are any of the Covered Activities (lights) visible from a beach?</td>
<td></td>
<td>No</td>
<td>If yes, describe the specific lights (type, height, purpose) &amp; specific location; provide map &amp; photos showing distance from beach</td>
</tr>
<tr>
<td>Have green sea turtles been known to nest on any beaches adjacent to the facilities?</td>
<td></td>
<td>No</td>
<td>If yes, provide information about nesting occurrences, if known, including location and date and any other information</td>
</tr>
</tbody>
</table>
## Kalaheo Powerhouse

### Table 1(h): Lighting at Kalaheo Powerhouse

<table>
<thead>
<tr>
<th>List of Buildings</th>
<th>Type/Description of Lights Present</th>
<th>Location</th>
<th>Purpose of the Lights</th>
<th>Describe any measures implemented to avoid or minimize take impacts to Covered Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Powerhouse</td>
<td>One three bulb fixture completely shielded</td>
<td>On powerhouse walls</td>
<td>Repairs at night</td>
<td>These lights are not usually turned on</td>
</tr>
<tr>
<td>&quot;</td>
<td>One downward pointed circular low wattage LED fixture</td>
<td>This fixture is under the eaves and is not visible from the sky</td>
<td>Repairs at night</td>
<td></td>
</tr>
<tr>
<td>&quot;</td>
<td>Two small wall sconces – no longer active</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Kalaheo Powerhouse

#### Table 2(h): Green Sea Turtle Assessment for Kalaheo Powerhouse

Please provide the information requested below to help determine if measures to avoid impacts to the Green Sea Turtle(s) from the effects of light attraction are required to be implemented at any of the facility(s), parcel(s), or site(s) included in this PIP. Please consult with staff from the DLNR and the USFWS to arrange a site visit, if needed, discuss measures to avoid impacts to the Green Sea Turtle, and provide further guidance.

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are any of the facilities located adjacent to a beach?</td>
<td></td>
<td>No</td>
<td>If yes, provide length of beach frontage &amp; brief description of facilities &amp; lights adjacent to the beach</td>
</tr>
<tr>
<td>Are any of the Covered Activities (lights) visible from a beach?</td>
<td></td>
<td>No</td>
<td>If yes, describe the specific lights (type, height, purpose) &amp; specific location; provide map &amp; photos showing distance from beach</td>
</tr>
<tr>
<td>Have green sea turtles been known to nest on any beaches adjacent to the facilities?</td>
<td></td>
<td>No</td>
<td>If yes, provide information about nesting occurrences, if known, including location and date and any other information</td>
</tr>
</tbody>
</table>
Wainiha Powerhouse
Table 1(i): Lighting at Wainiha Powerhouse

<table>
<thead>
<tr>
<th>List of Buildings</th>
<th>Type/Description of Lights Present</th>
<th>Location</th>
<th>Purpose of the Lights</th>
<th>Describe any measures implemented to avoid or minimize take impacts to Covered Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Powerhouse</td>
<td>Three small full cutoff fixtures</td>
<td>Attached to the powerhouse walls</td>
<td>Emergency nighttime repairs</td>
<td>These lights are not turned on except in the case of nighttime emergencies</td>
</tr>
<tr>
<td>Substation</td>
<td>None</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Wainiha Powerhouse

Table 2(i): Green Sea Turtle Assessment for Wainiha Powerhouse

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
<th>Additional Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are any of the facilities located adjacent to a beach?</td>
<td>No</td>
<td>If yes, provide length of beach frontage &amp; brief description of facilities &amp; lights adjacent to the beach</td>
</tr>
<tr>
<td>Are any of the Covered Activities (lights) visible from a beach?</td>
<td>No</td>
<td>If yes, describe the specific lights (type, height, purpose) &amp; specific location; provide map &amp; photos showing distance from beach</td>
</tr>
<tr>
<td>Have green sea turtles been known to nest on any beaches adjacent to the facilities?</td>
<td>No</td>
<td>If yes, provide information about nesting occurrences, if known, including location and date and any other information</td>
</tr>
<tr>
<td>List of Buildings</td>
<td>Type/Description of Lights Present</td>
<td>Location</td>
</tr>
<tr>
<td>------------------</td>
<td>-----------------------------------</td>
<td>----------</td>
</tr>
<tr>
<td>The shopping center contains 10 buildings (please see site plan in Appendix A).</td>
<td>101 full cutoff low wattage streetlights, three configurations</td>
<td>Within the parking lot</td>
</tr>
<tr>
<td></td>
<td>111 bucket wall lights, low wattage LEDs</td>
<td>Mounted on the store walls</td>
</tr>
<tr>
<td></td>
<td>94 cylindrical tube lights – low wattage LEDs</td>
<td>Mounted on the store walls</td>
</tr>
<tr>
<td></td>
<td>30 recessed can lights, low wattage LEDs</td>
<td>Mounted in the ceilings along the covered walkways</td>
</tr>
<tr>
<td></td>
<td>26 tube lights, two configurations</td>
<td>Mounted under awnings around the shopping center</td>
</tr>
<tr>
<td></td>
<td>1 large ceiling mounted flat panel LED</td>
<td>Mounted in the ceiling above a covered walkway</td>
</tr>
<tr>
<td>Lights Description</td>
<td>Mounted Location</td>
<td>Security and Customer Safety</td>
</tr>
<tr>
<td>--------------------</td>
<td>------------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>2 cylindrical UFO LED lights</td>
<td>Mounted on the exterior walls of the Jack in the Box</td>
<td>Security and customer safety</td>
</tr>
<tr>
<td>2 can flood lights</td>
<td>Mounted on the exterior walls of the Wendy’s</td>
<td>Security and customer safety</td>
</tr>
<tr>
<td>4 emergency exit box lights, CFL bulbs</td>
<td>Mounted above the emergency exit doors on the Petco Store</td>
<td>Emergency exit illumination</td>
</tr>
<tr>
<td>10 in ceiling CFL panels</td>
<td>Mounted in the ceiling above the gas pumps in the Chevron Station</td>
<td>Security and customer safety</td>
</tr>
<tr>
<td>7 wall mounted shielded can LED lights</td>
<td>Mounted on the exterior walls of American Savings</td>
<td>Security and customer safety</td>
</tr>
<tr>
<td>9 wall mounted tulip LED can lights</td>
<td>Mounted on the exterior walls of American Savings</td>
<td>Security and customer safety</td>
</tr>
<tr>
<td>Description</td>
<td>Location</td>
<td>Purpose</td>
</tr>
<tr>
<td>--------------------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>16 LED wall mounted shielded LED box lights</td>
<td>Mounted on the exterior walls of American Savings</td>
<td>Security and customer safety</td>
</tr>
<tr>
<td>1 LED fully shielded box light</td>
<td>Mounted beneath an awning at the drive through of American Savings</td>
<td>Security and customer safety</td>
</tr>
<tr>
<td>5 fully shielded LED Bollard lights</td>
<td>Installed along the eastern entrance road to the shopping Center</td>
<td>Security and customer safety</td>
</tr>
<tr>
<td>23 flat fully shielded LED panel lights</td>
<td>Mounted on the exterior walls of the Safeway Store</td>
<td>Security and customer safety</td>
</tr>
<tr>
<td>4 ceiling mounted can lights</td>
<td>Mounted on the ceiling of the entrance to the Safeway Store</td>
<td>Security and customer safety</td>
</tr>
<tr>
<td>5 in wall LED safety lights</td>
<td>Mounted in the walls of the Safeway loading dock</td>
<td>Security and employee safety</td>
</tr>
</tbody>
</table>
## Hokulei Shopping Village

### Table 2(j): Green Sea Turtle Assessment for Hokulei Shopping Village

Please provide the information requested below to help determine if measures to avoid impacts to the Green Sea Turtle(s) from the effects of light attraction are required to be implemented at any of the facility(s), parcel(s), or site(s) included in this PIP. Please consult with staff from the DLNR and the USFWS to arrange a site visit, if needed, discuss measures to avoid impacts to the Green Sea Turtle, and provide further guidance.

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are any of the facilities located adjacent to a beach?</td>
<td>No</td>
<td>If yes, provide length of beach frontage &amp; brief description of facilities &amp; lights adjacent to the beach</td>
</tr>
<tr>
<td>Are any of the Covered Activities (lights) visible from a beach?</td>
<td>No</td>
<td>If yes, describe the specific lights (type, height, purpose) &amp; specific location; provide map &amp; photos showing distance from beach</td>
</tr>
<tr>
<td>Have green sea turtles been known to nest on any beaches adjacent to the facilities?</td>
<td>No</td>
<td>If yes, provide information about nesting occurrences, if known, including location and date and any other information</td>
</tr>
</tbody>
</table>
The Shops at Kukui‘ula

Table 1(k): Lighting at The Shops at Kukui‘ula

<table>
<thead>
<tr>
<th>List of Buildings</th>
<th>Type/Description of Lights Present</th>
<th>Location</th>
<th>Purpose of the Lights</th>
<th>Describe any measures implemented to avoid or minimize take impacts to Covered Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shopping Center</td>
<td>67 LED streetlights full cutoff, pointed parallel to the ground</td>
<td>Parking lot</td>
<td>Safety and security</td>
<td></td>
</tr>
<tr>
<td>&quot;</td>
<td>6 flat panel LED parking lot lights</td>
<td>Employee Parking Lot</td>
<td>Safety and security</td>
<td></td>
</tr>
<tr>
<td>&quot;</td>
<td>Numerous lights with wide range of designs and wattages illuminating the shops</td>
<td>On and around the shops</td>
<td>Safety and security</td>
<td>The shopping center is in the process of developing a lighting plan for this facility that will reduce light emissions, and replace lights with dark sky compliant fixtures and/or lamps</td>
</tr>
</tbody>
</table>
The Shops at Kukui'ula

Table 2(k): Green Sea Turtle Assessment for The Shops at Kukui'ula

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Please provide the information requested below to help determine if measures to avoid impacts to the Green Sea Turtle(s) from the effects of light attraction are required to be implemented at any of the facility(s), parcel(s), or site(s) included in this PIP. Please consult with staff from the DLNR and the USFWS to arrange a site visit, if needed, discuss measures to avoid impacts to the Green Sea Turtle, and provide further guidance.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are any of the facilities located adjacent to a beach?</td>
<td>No</td>
<td>If yes, provide length of beach frontage &amp; brief description of facilities &amp; lights adjacent to the beach</td>
</tr>
<tr>
<td>Are any of the Covered Activities (lights) visible from a beach?</td>
<td>No</td>
<td>If yes, describe the specific lights (type, height, purpose) &amp; specific location; provide map &amp; photos showing distance from beach</td>
</tr>
<tr>
<td>Have green sea turtles been known to nest on any beaches adjacent to the facilities?</td>
<td>No</td>
<td>If yes, provide information about nesting occurrences, if known, including location and date and any other information</td>
</tr>
</tbody>
</table>
### Waipouli Town Center

#### Table 1(l): Lighting at Waipouli Town Center

<table>
<thead>
<tr>
<th>List of Buildings</th>
<th>Type/Description of Lights Present</th>
<th>Location</th>
<th>Purpose of the Lights</th>
<th>Describe any measures implemented to avoid or minimize take impacts to Covered Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shopping Center and a separate McDonalds building</td>
<td>Twenty-five full cutoff shielded parking lot streetlights in various configurations</td>
<td>In the parking lot</td>
<td>Safety and security</td>
<td>Full cutoff fixtures</td>
</tr>
<tr>
<td></td>
<td>Thirteen wall pack LED fixtures</td>
<td>Attached to the outside walls of the shopping center</td>
<td>Safety and security</td>
<td>Full cutoff fixtures</td>
</tr>
<tr>
<td></td>
<td>Two flat panel full cutoff LED wall packs</td>
<td>Attached to the outside walls of the shopping center in the loading dock area</td>
<td>Safety and security</td>
<td>Full cutoff fixtures</td>
</tr>
<tr>
<td></td>
<td>Two, two light bulb flood light fixtures, motion sensor triggered</td>
<td>Back wall of the shopping center</td>
<td>Safety and security</td>
<td>Motion triggered, not usually on</td>
</tr>
<tr>
<td>Thirty-one fully shielded low wattage LED ceiling fixtures</td>
<td>Mounted to the ceilings above the covered walkways – not visible from the sky</td>
<td>Safety and security</td>
<td>Full cutoff fixtures, not visible from the sky</td>
<td></td>
</tr>
<tr>
<td>------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------</td>
<td>---------------------</td>
<td>---------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>One floodlight under roof</td>
<td>Flood light under roof pointed at the cashier station of the McDonalds restaurant</td>
<td>Safety and security</td>
<td>Masked by roof overhang</td>
<td></td>
</tr>
</tbody>
</table>
### Waipouli Town Center

**Table 2(l): Green Sea Turtle Assessment for Waipouli Town Center**

Please provide the information requested below to help determine if measures to avoid impacts to the Green Sea Turtle(s) from the effects of light attraction are required to be implemented at any of the facility(s), parcel(s), or site(s) included in this PIP. Please consult with staff from the DLNR and the USFWS to arrange a site visit, if needed, discuss measures to avoid impacts to the Green Sea Turtle, and provide further guidance.

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are any of the facilities located adjacent to a beach?</td>
<td></td>
<td>No</td>
<td>If yes, provide length of beach frontage &amp; brief description of facilities &amp; lights adjacent to the beach</td>
</tr>
<tr>
<td>Are any of the Covered Activities (lights) visible from a beach?</td>
<td></td>
<td>No</td>
<td>If yes, describe the specific lights (type, height, purpose) &amp; specific location; provide map &amp; photos showing distance from beach</td>
</tr>
<tr>
<td>Have green sea turtles been known to nest on any beaches adjacent to the facilities?</td>
<td></td>
<td>No</td>
<td>If yes, provide information about nesting occurrences, if known, including location and date and any other information</td>
</tr>
</tbody>
</table>
## Kukui‘ula Development (Plantation Core/The Club)
### Table 1(m): Lighting at Kukui‘ula Development (Plantation Core/The Club)

<table>
<thead>
<tr>
<th>List of Buildings</th>
<th>Type/Description of Lights Present</th>
<th>Location</th>
<th>Purpose of the Lights</th>
<th>Describe any measures implemented to avoid or minimize take impacts to Covered Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parking Lots</td>
<td>3 walkway “mushroom” lights which are completely shielded and have low wattage LEDs</td>
<td>Along walkways</td>
<td>Path lighting and safety and security</td>
<td>Completely shielded low wattage dark sky LED fixtures</td>
</tr>
<tr>
<td>&quot;</td>
<td>79 tree-mounted fully shielded pencil can lights</td>
<td>In trees (lights are downward pointed in parking lot)</td>
<td>Parking lot safety and security</td>
<td>Completely shielded low wattage dark sky LED fixtures</td>
</tr>
<tr>
<td>Cart Barn and Mechanicals Building</td>
<td>15 low wattage CFL bulb lights in glass fixtures</td>
<td>Mounted on the walls</td>
<td>Safety and security</td>
<td>Low wattage CFLs</td>
</tr>
<tr>
<td>&quot;</td>
<td>2 flood lights with CFL bulbs</td>
<td>Mounted at the loading dock bay</td>
<td>Deliveries and service at night</td>
<td>Under eves, downward pointed and only turned on when needed</td>
</tr>
<tr>
<td>Porte Cochere</td>
<td>2 walkway “mushroom” lights which are completely shielded, low wattage LEDs</td>
<td>Along walkways</td>
<td>Path lighting and safety and security</td>
<td>Completely shielded low wattage dark sky LED fixtures</td>
</tr>
<tr>
<td>&quot;</td>
<td>8 gas candle lanterns</td>
<td>Along driveway and framing the entrance</td>
<td>Accent and mood</td>
<td>Very dim gas lanterns</td>
</tr>
<tr>
<td>Name</td>
<td>Type</td>
<td>Location</td>
<td>Purpose</td>
<td>Description</td>
</tr>
<tr>
<td>---------------------------</td>
<td>------------------------</td>
<td>-----------------------------------</td>
<td>-----------------------------------</td>
<td>-------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>8 tree mounted</td>
<td>fully shielded pencil</td>
<td>In trees downward pointed in</td>
<td>Accent and mood lighting</td>
<td>Completely shielded low wattage dark sky LED fixtures</td>
</tr>
<tr>
<td>Kukui‘ula Realty</td>
<td>can lights</td>
<td>trees</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 wall-mounted lanterns</td>
<td>with milk glass domes,</td>
<td>Mounted on entrance wall</td>
<td>Safety and security</td>
<td>Low wattage, shielded from above and under eves of the building</td>
</tr>
<tr>
<td>The Lodge</td>
<td>shielded from above</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 panel LED lights</td>
<td>West side</td>
<td>Exterior wall</td>
<td>Safety and security</td>
<td>Low wattage LEDs, all other lights are interior lights or completely shielded by the building</td>
</tr>
<tr>
<td>The Club</td>
<td>low wattage</td>
<td>Exterior walls</td>
<td>Safety and security</td>
<td>Low wattage, shielded from above, under eves, most under eves</td>
</tr>
<tr>
<td>17 oil lamp style</td>
<td>low wattage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 wall-mounted lanterns</td>
<td>milk glass domes,</td>
<td>Mounted on entrance wall</td>
<td>Safety and security</td>
<td>Low wattage, shielded from above and under eves of the building</td>
</tr>
<tr>
<td>&quot;</td>
<td>shielded from above</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9 gas candle lanterns</td>
<td>Exterior</td>
<td></td>
<td>Accent and mood</td>
<td>Very dim gas lanterns</td>
</tr>
<tr>
<td>&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 wall-mounted lanterns</td>
<td>milk glass domes,</td>
<td>Mounted on buildings</td>
<td>Safety and security</td>
<td>Low wattage, shielded from above and most under eves of the buildings</td>
</tr>
<tr>
<td>&quot;</td>
<td>shielded from above</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&quot;&quot;</td>
<td>16 square “ship” lantern fixtures, LED frosted glass</td>
<td>Mounted on buildings</td>
<td>Safety and security</td>
<td>Low wattage, shielded from above and under eves of the buildings</td>
</tr>
<tr>
<td>Pool area structures</td>
<td>8 wall-mounted lantern lights in milk glass domes, shielded from above</td>
<td>Mounted on buildings</td>
<td>Safety and security</td>
<td>Low wattage, shielded from above and most under eves of the buildings</td>
</tr>
<tr>
<td>&quot;&quot;</td>
<td>2 white glass lanterns, shielded from above</td>
<td>Mounted on buildings</td>
<td>Safety and security</td>
<td>Low wattage, shielded from above and under eves of the buildings</td>
</tr>
<tr>
<td>&quot;&quot;</td>
<td>51 white pencil cylinder can lights, LED</td>
<td>Mounted inside the cabanas on the underside of the roof pointed at the ground</td>
<td>Safety and security and mood lighting</td>
<td>Low wattage, dark sky compliant, shielded completely under roof in the cabanas, not visible from above</td>
</tr>
<tr>
<td>&quot;&quot;</td>
<td>The pool is lit with low wattage 38 watt LED fixtures</td>
<td>Mounted on the pool floor and walls</td>
<td>Safety and security</td>
<td></td>
</tr>
<tr>
<td>Landscaping</td>
<td>61 walkway “mushroom” lights which are completely shielded and have low wattage LEDs</td>
<td>Along walkways</td>
<td>Path lighting and safety and security</td>
<td>Completely shielded low wattage dark sky LED fixtures</td>
</tr>
<tr>
<td>&quot;&quot;</td>
<td>36 tree-mounted fully shielded pencil can lights</td>
<td>In trees, downward pointed in the ground</td>
<td>Safety and security and mood lighting</td>
<td>Completely shielded low wattage dark sky LED fixtures</td>
</tr>
<tr>
<td></td>
<td>20 in-wall, fully shielded, 20 watt step lights, shielded, low wattage</td>
<td>Mounted in the rock sides of the exterior stairs</td>
<td>Safety and security and mood lighting</td>
<td>Completely shielded low wattage dark sky LED fixtures</td>
</tr>
<tr>
<td>------------------------------------------</td>
<td>-----------------------------------------------------------------------</td>
<td>-------------------------------------------------</td>
<td>--------------------------------------</td>
<td>-----------------------------------------------------</td>
</tr>
</tbody>
</table>


### Table 2(m): Green Sea Turtle Assessment for Kukui'ula Development (Plantation Core/The Club)

Please provide the information requested below to help determine if measures to avoid impacts to the Green Sea Turtle(s) from the effects of light attraction are required to be implemented at any of the facility(s), parcel(s), or site(s) included in this PIP. Please consult with staff from the DLNR and the USFWS to arrange a site visit, if needed, discuss measures to avoid impacts to the Green Sea Turtle, and provide further guidance.

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are any of the facilities located adjacent to a beach?</td>
<td>No</td>
<td>If yes, provide length of beach frontage &amp; brief description of facilities &amp; lights adjacent to the beach</td>
</tr>
<tr>
<td>Are any of the Covered Activities (lights) visible from a beach?</td>
<td>No</td>
<td>If yes, describe the specific lights (type, height, purpose) &amp; specific location; provide map &amp; photos showing distance from beach</td>
</tr>
<tr>
<td>Have green sea turtles been known to nest on any beaches adjacent to the facilities?</td>
<td>No</td>
<td>If yes, provide information about nesting occurrences, if known, including location and date and any other information</td>
</tr>
</tbody>
</table>
Item 4. If applicable, describe any lighting standards (e.g., foot candles/area) required for facility operations or other requirements that necessitate the use of lighting (e.g., required for security, safety, operations). Describe the relevant standard, or regulation, and the areas and Covered Activities at the site (e.g., type of lighting) to which it applies.

There are no specific lighting standards, rules, restrictions or requirements that the properties in this Participant Inclusion Plan must comply with, beyond assuring that lighting is adequate to ensure safety and security for employees and, if applicable, guests. Pre-seabird season lighting audits are conducted by a seabird biologist and necessary adjustments to the lighting are completed prior to the start of the seabird season each year.

Item 5. Describe any plans/proposals for future facilities or expansion of existing facilities. Include any proposed structures and lighting by type, purpose, and location. Plans (architecture and site plans), photos, and drawings can be attached.

Port Allen Solar Farm
At the present time, McBryde has no future plans for the Port Allen Solar Farm that would require the installation of additional exterior lights.

Port Allen Center I and II
At the present time, A&B has no future plans for Port Allen Center I and II that would require the installation of additional exterior lights.

Port Allen South Parcels
At the present time, A&B has no future plans for the Port Allen south parcels that would require the installation of additional exterior lights.

Port Allen Parking Lots
At the present time, A&B has no future plans for the Port Allen Parking Lots that would require the installation of additional exterior lights.

Port Allen Steel Warehouse
At the present time, A&B has no future plans for the Port Allen Steel Warehouse that would require the installation of additional exterior lights.

Port Allen Marina Center
At the present time, A&B has no future plans for the Port Allen Marina Center that would require the installation of additional exterior lights.

Pump 3 Hanapepe Valley
At the present time, A&B has no future plans for Pump 3 in Hanapepe Valley that would require the installation of additional exterior lights.
Kalaheo Powerhouse
At the present time, McBryde has no future plans for the Kalaheo Powerhouse that would require the installation of additional exterior lights.

Wainiha Powerhouse
At the present time, McBryde has no future plans for the Kalaheo Powerhouse that would require the installation of additional exterior lights.

Hokulei Shopping Village
Currently there is a plan to construct a free standing Walgreen’s store on this property. All lights that will be installed will be dark sky compliant, full cut off lights, most likely low wattage LEDs.

The Shops at Kukui‘ula
A&B is currently working on developing a new lighting plan for this shopping center. Significant changes will be made to the exterior lighting, with the goal of reducing light emissions.

Waipouli Town Center
At the present time, A&B has no future plans for the Waipouli Town Center that would require the installation of additional exterior lights.

Kukui‘ula Development (Plantation Core/The Club)
At the present time, Kukui‘ula Development Company has no future plans for the Plantation Core/The Club that would require the installation of additional exterior lights.
Item 6. Pursuant to the Endangered Species Act (ESA), Section 10 (a)(2)(A)(iii), describe alternatives to avoid the taking considered and evaluated. Provide reasons why those alternatives are not being utilized. Alternatives can include operational or facility design changes (attach pages as needed). The tables below may be altered as needed.
### Table 3(a): Light Attraction Alternatives to the Taking at Port Allen Solar Farm

<table>
<thead>
<tr>
<th>Artificial Light Attraction Alternatives to the Taking Considered</th>
<th>Reasons Alternatives are not Being Utilized (provide justification)</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Deactivate all outdoor artificial lights from dusk to dawn during the fledgling fall-out season September 15 to December 15</td>
<td>Lights are not turned on except when a nighttime emergency requires maintenance</td>
</tr>
<tr>
<td>▪ Change operations to eliminate the need for outdoor artificial lighting (e.g., from nighttime to daylight hours)</td>
<td>N/A</td>
</tr>
<tr>
<td>▪ Shield all lights from visibility from the beach, or screen all Green Sea Turtle nests, from May 15 to December 15 to avoid impacting the green sea turtle (Green Sea Turtle)</td>
<td>N/A</td>
</tr>
<tr>
<td>▪ Other alternatives to the taking considered, if any. If facility is proposed, include alternative designs considered</td>
<td>N/A</td>
</tr>
</tbody>
</table>
## Port Allen Center I and II

### Table 3(b): Light Attraction Alternatives to the Taking at Port Allen Center I and II

<table>
<thead>
<tr>
<th>Artificial Light Attraction Alternatives to the Taking Considered</th>
<th>Reasons Alternatives are not Being Utilized (provide justification)</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Deactivate all outdoor artificial lights from dusk to dawn during the fledgling fall-out season September 15 to December 15</td>
<td>Lighting at both of these facilities is minimal. Safety and security preclude completely turning off all lights at night</td>
</tr>
<tr>
<td>▪ Change operations to eliminate the need for outdoor artificial lighting (e.g., from nighttime to daylight hours)</td>
<td>Not practicable</td>
</tr>
<tr>
<td>▪ Shield all lights from visibility from the beach, or screen all Green Sea Turtle nests, from May 15 to December 15 to avoid impacting the green sea turtle (Green Sea Turtle)</td>
<td>N/A</td>
</tr>
<tr>
<td>▪ Other alternatives to the taking considered, if any. If facility is proposed, include alternative designs considered</td>
<td></td>
</tr>
</tbody>
</table>

DRAFT
### Port Allen South Parcels

**Table 3(c): Light Attraction Alternatives to the Taking at Port Allen South Parcels**

<table>
<thead>
<tr>
<th>Artificial Light Attraction Alternatives to the Taking Considered</th>
<th>Reasons Alternatives are not Being Utilized (provide justification)</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Deactivate all outdoor artificial lights from dusk to dawn during the fledgling fall-out season September 15 to December 15</td>
<td>Completed</td>
</tr>
<tr>
<td>▪ Change operations to eliminate the need for outdoor artificial lighting (e.g., from nighttime to daylight hours)</td>
<td>N/A</td>
</tr>
<tr>
<td>▪ Shield all lights from visibility from the beach, or screen all Green Sea Turtle nests, from May 15 to December 15 to avoid impacting the green sea turtle (Green Sea Turtle)</td>
<td>All streetlights are full cutoff dark sky compliant fixtures.</td>
</tr>
<tr>
<td>▪ Other alternatives to the taking considered, if any. If facility is proposed, include alternative designs considered</td>
<td>N/A</td>
</tr>
</tbody>
</table>
Port Allen Parking Lots

Table 3(d): Light Attraction Alternatives to the Taking at Port Allen Parking Lots

<table>
<thead>
<tr>
<th>Artificial Light Attraction Alternatives to the Taking Considered</th>
<th>Reasons Alternatives are not Being Utilized (provide justification)</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Deactivate all outdoor artificial lights from dusk to dawn during the fledgling fall-out season September 15 to December 15</td>
<td>Safety and security preclude completely turning off all streetlights at night</td>
</tr>
<tr>
<td>▪ Change operations to eliminate the need for outdoor artificial lighting (e.g., from nighttime to daylight hours)</td>
<td>N/A</td>
</tr>
<tr>
<td>▪ Shield all lights from visibility from the beach, or screen all Green Sea Turtle nests, from May 15 to December 15 to avoid impacting the green sea turtle (Green Sea Turtle)</td>
<td>The parking lot lights are shielded</td>
</tr>
<tr>
<td>▪ Other alternatives to the taking considered, if any. If facility is proposed, include alternative designs considered</td>
<td></td>
</tr>
</tbody>
</table>
### Port Allen Steel Warehouse

**Table 3(e): Light Attraction Alternatives to the Taking at Port Allen Steel Warehouse**

<table>
<thead>
<tr>
<th>Artificial Light Attraction Alternatives to the Taking Considered</th>
<th>Reasons Alternatives are not Being Utilized (provide justification)</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Deactivate all outdoor artificial lights from dusk to dawn during the fledgling fall-out season September 15 to December 15</td>
<td>Has been completed</td>
</tr>
<tr>
<td>▪ Change operations to eliminate the need for outdoor artificial lighting (e.g., from nighttime to daylight hours)</td>
<td>See above</td>
</tr>
<tr>
<td>▪ Shield all lights from visibility from the beach, or screen all Green Sea Turtle nests, from May 15 to December 15 to avoid impacting the green sea turtle (Green Sea Turtle)</td>
<td>N/A</td>
</tr>
<tr>
<td>▪ Other alternatives to the taking considered, if any. If facility is proposed, include alternative designs considered</td>
<td>N/A</td>
</tr>
</tbody>
</table>
### Table 3(f): Light Attraction Alternatives to the Taking at Port Allen Marina Center

<table>
<thead>
<tr>
<th>Artificial Light Attraction Alternatives to the Taking Considered</th>
<th>Reasons Alternatives are not Being Utilized (provide justification)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Deactivate all outdoor artificial lights from dusk to dawn during the fledgling fall-out season September 15 to December 15</td>
<td>Safety and security preclude completely turning off all lights at night. Half of the wall sconces are turned off at 9:00 pm during the seabird fledging season. A&amp;B is in the process of lowering the wattage of the bulbs in the wall sconces.</td>
<td></td>
</tr>
<tr>
<td>▪ Change operations to eliminate the need for outdoor artificial lighting (e.g., from nighttime to daylight hours)</td>
<td>Not practicable. Safety and security preclude completely turning off all lights at night</td>
<td></td>
</tr>
<tr>
<td>▪ Shield all lights from visibility from the beach, or screen all Green Sea Turtle nests, from May 15 to December 15 to avoid impacting the green sea turtle (Green Sea Turtle)</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>▪ Other alternatives to the taking considered, if any. If facility is proposed, include alternative designs considered</td>
<td>Modification and/or replacement of wall sconce lighting is being evaluated</td>
<td></td>
</tr>
</tbody>
</table>
### Pump 3 Hanapepe Valley

**Table 3(g): Light Attraction Alternatives to the Taking at Pump 3 Hanapepe Valley**

<table>
<thead>
<tr>
<th>Artificial Light Attraction Alternatives to the Taking Considered</th>
<th>Reasons Alternatives are not Being Utilized (provide justification)</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Deactivate all outdoor artificial lights from dusk to dawn during the fledgling fall-out season September 15 to December 15</td>
<td>Completed</td>
</tr>
<tr>
<td>▪ Change operations to eliminate the need for outdoor artificial lighting (e.g., from nighttime to daylight hours)</td>
<td>N/A</td>
</tr>
<tr>
<td>▪ Shield all lights from visibility from the beach, or screen all Green Sea Turtle nests, from May 15 to December 15 to avoid impacting the green sea turtle (Green Sea Turtle)</td>
<td>N/A</td>
</tr>
<tr>
<td>▪ Other alternatives to the taking considered, if any. If facility is proposed, include alternative designs considered</td>
<td>N/A</td>
</tr>
</tbody>
</table>
### Kalaheo Powerhouse

**Table 3(h): Light Attraction Alternatives to the Taking at Kalaheo Powerhouse**

<table>
<thead>
<tr>
<th>Artificial Light Attraction Alternatives to the Taking Considered</th>
<th>Reasons Alternatives are not Being Utilized (provide justification)</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Deactivate <strong>all</strong> outdoor artificial lights from dusk to dawn during the fledgling fall-out season September 15 to December 15</td>
<td>Completed</td>
</tr>
<tr>
<td>- Change operations to eliminate the need for outdoor artificial lighting (e.g., from nighttime to daylight hours)</td>
<td>N/A</td>
</tr>
<tr>
<td>- Shield all lights from visibility from the beach, or screen all Green Sea Turtle nests, from May 15 to December 15 to avoid impacting the green sea turtle (Green Sea Turtle)</td>
<td>N/A</td>
</tr>
<tr>
<td>- Other alternatives to the taking considered, if any. If facility is proposed, include alternative designs considered</td>
<td>N/A</td>
</tr>
</tbody>
</table>
## Wainiha Powerhouse

### Table 3(i): Light Attraction Alternatives to the Taking at Wainiha Powerhouse

<table>
<thead>
<tr>
<th>Artificial Light Attraction Alternatives to the Taking Considered</th>
<th>Reasons Alternatives are not Being Utilized (provide justification)</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Deactivate all outdoor artificial lights from dusk to dawn during the fledgling fall-out season September 15 to December 15</td>
<td>Completed</td>
</tr>
<tr>
<td>▪ Change operations to eliminate the need for outdoor artificial lighting (e.g., from nighttime to daylight hours)</td>
<td>N/A</td>
</tr>
<tr>
<td>▪ Shield all lights from visibility from the beach, or screen all Green Sea Turtle nests, from May 15 to December 15 to avoid impacting the green sea turtle (Green Sea Turtle)</td>
<td>N/A</td>
</tr>
<tr>
<td>▪ Other alternatives to the taking considered, if any. If facility is proposed, include alternative designs considered</td>
<td>N/A</td>
</tr>
</tbody>
</table>
### Hokulei Shopping Village

#### Table 3(j): Light Attraction Alternatives to the Taking at Hokulei Shopping Village

<table>
<thead>
<tr>
<th>Artificial Light Attraction Alternatives to the Taking Considered</th>
<th>Reasons Alternatives are not Being Utilized (provide justification)</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Deactivate all outdoor artificial lights from dusk to dawn during the fledgling fall-out season September 15 to December 15</td>
<td>Safety and security preclude completely turning off all lights at night</td>
</tr>
<tr>
<td>▪ Change operations to eliminate the need for outdoor artificial lighting (e.g., from nighttime to daylight hours)</td>
<td>Safety and security preclude completely turning off all lights at night</td>
</tr>
<tr>
<td>▪ Shield all lights from visibility from the beach, or screen all Green Sea Turtle nests, from May 15 to December 15 to avoid impacting the green sea turtle (Green Sea Turtle)</td>
<td>N/A</td>
</tr>
<tr>
<td>▪ Other alternatives to the taking considered, if any. If facility is proposed, include alternative designs considered</td>
<td>N/A</td>
</tr>
</tbody>
</table>
### The Shops at Kukui‘ula

#### Table 3(k): Light Attraction Alternatives to the Taking at The Shops at Kukui‘ula

<table>
<thead>
<tr>
<th>Artificial Light Attraction Alternatives to the Taking Considered</th>
<th>Reasons Alternatives are not Being Utilized (provide justification)</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Deactivate all outdoor artificial lights from dusk to dawn during the fledgling fall-out season September 15 to December 15</td>
<td>Safety and security preclude completely turning off all lights at night</td>
</tr>
<tr>
<td>▪ Change operations to eliminate the need for outdoor artificial lighting (e.g., from nighttime to daylight hours)</td>
<td>Safety and security preclude completely turning off all lights at night</td>
</tr>
<tr>
<td>▪ Shield all lights from visibility from the beach, or screen all Green Sea Turtle nests, from May 15 to December 15 to avoid impacting the green sea turtle (Green Sea Turtle)</td>
<td>N/A</td>
</tr>
<tr>
<td>▪ Other alternatives to the taking considered, if any. If facility is proposed, include alternative designs considered</td>
<td>A&amp;B is currently working on re-designing the lighting at the shopping Center to reduce light attraction</td>
</tr>
<tr>
<td>Artificial Light Attraction Alternatives to the Taking Considered</td>
<td>Reasons Alternatives are not Being Utilized (provide justification)</td>
</tr>
<tr>
<td>---------------------------------------------------------------</td>
<td>---------------------------------------------------------------</td>
</tr>
<tr>
<td>▪ Deactivate all outdoor artificial lights from dusk to dawn during the fledgling fall-out season September 15 to December 15</td>
<td>Safety and security preclude completely turning off all lights at night</td>
</tr>
<tr>
<td>▪ Change operations to eliminate the need for outdoor artificial lighting (e.g., from nighttime to daylight hours)</td>
<td>Safety and security preclude completely turning off all lights at night</td>
</tr>
<tr>
<td>▪ Shield all lights from visibility from the beach, or screen all Green Sea Turtle nests, from May 15 to December 15 to avoid impacting the green sea turtle (Green Sea Turtle)</td>
<td>N/A</td>
</tr>
<tr>
<td>▪ Other alternatives to the taking considered, if any. If facility is proposed, include alternative designs considered</td>
<td>N/A</td>
</tr>
<tr>
<td>Artificial Light Attraction Alternatives to the Taking Considered</td>
<td>Reasons Alternatives are not Being Utilized (provide justification)</td>
</tr>
<tr>
<td>---------------------------------------------------------------</td>
<td>---------------------------------------------------------------------</td>
</tr>
<tr>
<td>▪ Deactivate all outdoor artificial lights from dusk to dawn during the fledgling fall-out season September 15 to December 15</td>
<td>Safety and security preclude completely turning off all lights at night</td>
</tr>
<tr>
<td>▪ Change operations to eliminate the need for outdoor artificial lighting (e.g., from nighttime to daylight hours)</td>
<td>Safety and security preclude completely turning off all lights at night</td>
</tr>
<tr>
<td>▪ Shield all lights from visibility from the beach, or screen all Green Sea Turtle nests, from May 15 to December 15 to avoid impacting the green sea turtle (Green Sea Turtle)</td>
<td>N/A</td>
</tr>
<tr>
<td>▪ Other alternatives to the taking considered, if any. If facility is proposed, include alternative designs considered</td>
<td>N/A</td>
</tr>
</tbody>
</table>
Item 7. Describe all site-specific seabird minimization measures considered for the Covered Activities. This item should follow KSHCP minimization objectives and measures as specified in Appendix E (Guidelines for Adjusting Lighting at Facilities) of the KSHCP document. Please consult with staff from the DOFAW and the USFWS as needed. The suggested tables below can be altered as needed.

Minimization measures modify the Covered Activities to reduce the effects of the activity on the Covered Species. KSHCP Participants will be required to implement minimization measures that apply to the facility to the “maximum extent practicable” per applicable state and federal laws which regulate incidental take license/permit issuance by the DLNR and the USFWS.

Minimization also entails searching and recovering grounded seabirds to minimize the chance of mortality. In addition, the presence of on-site predators (i.e. feral cats, dogs) should be controlled and removed because these animals can prey on grounded seabirds.

Provide justification, such as policies, regulations, or other rationale for measures that will not be implemented.
### Table 4(a): Seabird Light Attraction Minimization Measures Considered at Port Allen Solar Farm

<table>
<thead>
<tr>
<th>Minimization Measures Considered</th>
<th>Feasible? (Y / N)</th>
<th>If not Feasible to Implement Measures, Provide Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Change time of light use (lights off earlier)</td>
<td>Yes / No</td>
<td>Currently the two over door lights are not turned on unless there is an emergency</td>
</tr>
<tr>
<td>▪ Deactivate unnecessary lights</td>
<td>Yes / No</td>
<td>This is a relatively new facility and there are no extraneous lighting fixtures</td>
</tr>
<tr>
<td>▪ Replace all outdoor lights with full cut-off fixtures</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Shield all outdoor lights with full cut-off shields</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Angle all lights downward</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Lower intensity (lumens) of outdoor lights</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Change bulb color to non-white spectrum</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Prohibit/control unleashed predatory animals; prohibit outdoor feeding of animals; require sealed rubbish containers</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Provide Worker Seabird Awareness Training to staff</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Provide outreach materials to staff &amp; guests</td>
<td>Yes / No</td>
<td>Not applicable – this is a power generation facility and there are no guests</td>
</tr>
<tr>
<td>▪ Host Save Our Shearwaters (SOS) Aid Station</td>
<td>Yes / No</td>
<td>There is an SOS Aid Station close by next to the Island Energy Services Fuel Tank Farm</td>
</tr>
</tbody>
</table>
### Table 4(b): Seabird Light Attraction Minimization Measures Considered at Port Allen Center I and II

<table>
<thead>
<tr>
<th>Minimization Measures Considered</th>
<th>Feasible? (Y/N)</th>
<th>If not Feasible to Implement Measures, Provide Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Change time of light use (lights off earlier)</td>
<td>Yes / No</td>
<td>Numerous older light fixtures have been deactivated or replaced with new fixtures in the past five years</td>
</tr>
<tr>
<td>▪ Deactivate unnecessary lights</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Replace all outdoor lights with full cut-off fixtures</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Shield all outdoor lights with full cut-off shields</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Angle all lights downward</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Lower intensity (lumens) of outdoor lights</td>
<td>Yes / No</td>
<td>All new lighting fixtures are low wattage LEDs</td>
</tr>
<tr>
<td>▪ Change bulb color to non-white spectrum</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Prohibit/control unleashed predatory animals; prohibit outdoor feeding of animals; require sealed rubbish containers</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Provide Worker Seabird Awareness Training to staff</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Provide outreach materials to staff &amp; guests</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Host Save Our Shearwaters (SOS) Aid Station</td>
<td>Yes / No</td>
<td>There is an SOS Aid Station close by next to the Island Energy Services Fuel Tank Farm</td>
</tr>
</tbody>
</table>
### Table 4(c): Seabird Light Attraction Minimization Measures Considered at Port Allen South Parcels

<table>
<thead>
<tr>
<th>Minimization Measures Considered</th>
<th>Feasible? (Y / N)</th>
<th>If not Feasible to Implement Measures, Provide Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change time of light use (lights off earlier)</td>
<td>Yes / No</td>
<td>There are no lights on either of these parcels</td>
</tr>
<tr>
<td>Deactivate unnecessary lights</td>
<td>Yes / No</td>
<td>Complete</td>
</tr>
<tr>
<td>Replace all outdoor lights with full cut-off fixtures</td>
<td>Yes / No</td>
<td>There are no lights on either of these parcels</td>
</tr>
<tr>
<td>Shield all outdoor lights with full cut-off shields</td>
<td>Yes / No</td>
<td>There are no lights on either of these parcels</td>
</tr>
<tr>
<td>Angle all lights downward</td>
<td>Yes / No</td>
<td>There are no lights on either of these parcels</td>
</tr>
<tr>
<td>Lower intensity (lumens) of outdoor lights</td>
<td>Yes / No</td>
<td>There are no lights on either of these parcels</td>
</tr>
<tr>
<td>Change bulb color to non-white spectrum</td>
<td>Yes / No</td>
<td>There are no lights on either of these parcels</td>
</tr>
<tr>
<td>Prohibit/control unleashed predatory animals; prohibit outdoor feeding of animals; require sealed rubbish containers</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>Provide Worker Seabird Awareness Training to staff</td>
<td>Yes / No</td>
<td>A&amp;B has no workers on the vacant lot or the BEI parcel, but A&amp;B will provide seabird awareness training to its property management staff.</td>
</tr>
<tr>
<td>Provide outreach materials to staff &amp; guests</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>Host Save Our Shearwaters (SOS) Aid Station</td>
<td>Yes / No</td>
<td>There is an SOS Aid Station close by next to the Island Energy Services Fuel Tank Farm</td>
</tr>
</tbody>
</table>
Port Allen Parking Lots  
Table 4(d): Seabird Light Attraction Minimization Measures Considered at Port Allen Parking Lots

<table>
<thead>
<tr>
<th>Minimization Measures Considered</th>
<th>Feasible? (Y / N)</th>
<th>If not Feasible to Implement Measures, Provide Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Change time of light use (lights off earlier)</td>
<td>Yes / No</td>
<td>For safety and security reasons, lighting is needed in the parking lot</td>
</tr>
<tr>
<td>▪ Deactivate unnecessary lights</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Replace all outdoor lights with full cut-off fixtures</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Shield all outdoor lights with full cut-off shields</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Angle all lights downward</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Lower intensity (lumens) of outdoor lights</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Change bulb color to non-white spectrum</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Prohibit/control unleashed predatory animals; prohibit outdoor feeding of animals; require sealed rubbish containers</td>
<td>Yes / No</td>
<td>These restrictions are in place for the Marina Center served by the parking lot. However, this parking lot is not fenced and is between two harbor/launch facilities. It is impossible to effectively control all predators in the greater harbor area.</td>
</tr>
<tr>
<td>▪ Provide Worker Seabird Awareness Training to staff</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Provide outreach materials to staff &amp; guests</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Host Save Our Shearwaters (SOS) Aid Station</td>
<td>Yes / No</td>
<td>There is an SOS Aid Station close by next to the Island Energy Services Fuel Tank Farm</td>
</tr>
</tbody>
</table>
Port Allen Steel Warehouse  
Table 4(e): Seabird Light Attraction Minimization Measures Considered at Port Allen Steel Warehouse

<table>
<thead>
<tr>
<th>Minimization Measures Considered</th>
<th>Feasible? (Y / N)</th>
<th>If not Feasible to Implement Measures, Provide Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Change time of light use (lights off earlier)</td>
<td>Yes / No</td>
<td>Exterior lighting is motion activated so it is usually dark at night</td>
</tr>
<tr>
<td>▪ Deactivate unnecessary lights</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Replace all outdoor lights with full cut-off fixtures</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Shield all outdoor lights with full cut-off shields</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Angle all lights downward</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Lower intensity (lumens) of outdoor lights</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Change bulb color to non-white spectrum</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Prohibit/control unleashed predatory animals; prohibit outdoor feeding of animals; require sealed rubbish containers</td>
<td>Yes / No</td>
<td>Due to high crime, one tenant maintains watchdogs within his fenced yard</td>
</tr>
<tr>
<td>▪ Provide Worker Seabird Awareness Training to staff</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Provide outreach materials to staff &amp; guests</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Host Save Our Shearwaters (SOS) Aid Station</td>
<td>Yes / No</td>
<td>There is an SOS Aid Station close by next to the Island Energy Services Fuel Tank Farm</td>
</tr>
</tbody>
</table>
Port Allen Marina Center

Table 4(f): Seabird Light Attraction Minimization Measures Considered at Port Allen Marina Center

<table>
<thead>
<tr>
<th>Minimization Measures Considered</th>
<th>Feasible? (Y / N)</th>
<th>If not Feasible to Implement Measures, Provide Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Change time of light use (lights off earlier)</td>
<td>Yes / No</td>
<td>Most of the stores in the center are closed after dark, and their interior lights turned off. The Marina Center turns off every other wall sconce light at 9:00 pm during the seabird fallout season.</td>
</tr>
<tr>
<td>▪ Deactivate unnecessary lights</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Replace all outdoor lights with full cut-off fixtures</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Shield all outdoor lights with full cut-off shields</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Angle all lights downward</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Lower intensity (lumens) of outdoor lights</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Change bulb color to non-white spectrum</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Prohibit/control unleashed predatory animals; prohibit outdoor feeding of animals; require sealed rubbish containers</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Provide Worker Seabird Awareness Training to staff</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Provide outreach materials to staff &amp; guests</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Host Save Our Shearwaters (SOS) Aid Station</td>
<td>Yes / No</td>
<td>There is an SOS Aid Station close by next to the Island Energy Services Fuel Tank Farm</td>
</tr>
</tbody>
</table>
### Pump 3 Hanapepe Valley

#### Table 4(g): Seabird Light Attraction Minimization Measures Considered at Pump 3 Hanapepe Valley

<table>
<thead>
<tr>
<th>Minimization Measures Considered</th>
<th>Feasible? (Y / N)</th>
<th>If not Feasible to Implement Measures, Provide Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Change time of light use (lights off earlier)</td>
<td>Yes / No</td>
<td>Lights are not turned on unless emergency nighttime repairs are required</td>
</tr>
<tr>
<td>▪ Deactivate unnecessary lights</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Replace all outdoor lights with full cut-off fixtures</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Shield all outdoor lights with full cut-off shields</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Angle all lights downward</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Lower intensity (lumens) of outdoor lights</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Change bulb color to non-white spectrum</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Prohibit/control unleashed predatory animals; prohibit outdoor feeding of animals; require sealed rubbish containers</td>
<td>Yes / No</td>
<td>Predatory animal control is not feasible outside of the fenced portion of the facility as this is a rural area</td>
</tr>
<tr>
<td>▪ Provide Worker Seabird Awareness Training to staff</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Provide outreach materials to staff &amp; guests</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Host Save Our Shearwaters (SOS) Aid Station</td>
<td>Yes / No</td>
<td>This area is too isolated to warrant an aid station, and no downed seabirds have ever been recovered from this site.</td>
</tr>
</tbody>
</table>
### Kalaheo Powerhouse
**Table 4(h): Seabird Light Attraction Minimization Measures Considered at Kalaheo Powerhouse**

<table>
<thead>
<tr>
<th>Minimization Measures Considered</th>
<th>Feasible? (Y / N)</th>
<th>If not Feasible to Implement Measures, Provide Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Change time of light use (lights off earlier)</td>
<td>Yes / No</td>
<td>Lights are not turned on unless emergency nighttime repairs are required</td>
</tr>
<tr>
<td>▪ Deactivate unnecessary lights</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Replace all outdoor lights with full cut-off fixtures</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Shield all outdoor lights with full cut-off shields</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Angle all lights downward</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Lower intensity (lumens) of outdoor lights</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Change bulb color to non-white spectrum</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Prohibit/control unleashed predatory animals; prohibit outdoor feeding of animals; require sealed rubbish containers</td>
<td>Yes / No</td>
<td>Predator control is not feasible outside the fenced portion of the facility due to the rural area</td>
</tr>
<tr>
<td>▪ Provide Worker Seabird Awareness Training to staff</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Provide outreach materials to staff &amp; guests</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Host Save Our Shearwaters (SOS) Aid Station</td>
<td>Yes / No</td>
<td>This area is too isolated to warrant an aid station, and no downed seabirds have ever been recovered from this site.</td>
</tr>
<tr>
<td>Minimization Measures Considered</td>
<td>Feasible? (Y / N)</td>
<td>If not Feasible to Implement Measures, Provide Reason</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------------------------------</td>
<td>-------------------</td>
<td>------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>▪ Change time of light use (lights off earlier)</td>
<td>Yes / No</td>
<td>Lights are not turned on unless emergency nighttime repairs are required</td>
</tr>
<tr>
<td>▪ Deactivate unnecessary lights</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Replace all outdoor lights with full cut-off fixtures</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Shield all outdoor lights with full cut-off shields</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Angle all lights downward</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Lower intensity (lumens) of outdoor lights</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Change bulb color to non-white spectrum</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Prohibit/control unleashed predatory animals; prohibit outdoor feeding of animals; require sealed rubbish containers</td>
<td>Yes / No</td>
<td>Predator control is not feasible outside the fenced portion of the facility as this is a wildland area</td>
</tr>
<tr>
<td>▪ Provide Worker Seabird Awareness Training to staff</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Provide outreach materials to staff &amp; guests</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Host Save Our Shearwaters (SOS) Aid Station</td>
<td>Yes / No</td>
<td>This area is too remote to warrant an aid station</td>
</tr>
</tbody>
</table>
Hokulei Shopping Village  
Table 4(j): Seabird Light Attraction Minimization Measures Considered at Hokulei Shopping Village

<table>
<thead>
<tr>
<th>Minimization Measures Considered</th>
<th>Feasible? (Y / N)</th>
<th>If not Feasible to Implement Measures, Provide Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Change time of light use (lights off earlier)</td>
<td>Yes / No</td>
<td>Security and safety of employees and guests preclude this option</td>
</tr>
<tr>
<td>▪ Deactivate unnecessary lights</td>
<td>Yes / No</td>
<td>This is a new shopping center where lighting was designed to be dark sky compliant</td>
</tr>
<tr>
<td>▪ Replace all outdoor lights with full cut-off fixtures</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Shield all outdoor lights with full cut-off shields</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Angle all lights downward</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Lower intensity (lumens) of outdoor lights</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Change bulb color to non-white spectrum</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Prohibit/control unleashed predatory animals; prohibit outdoor feeding of animals; require sealed rubbish containers</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Provide Worker Seabird Awareness Training to staff</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Provide outreach materials to staff &amp; guests</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Host Save Our Shearwaters (SOS) Aid Station</td>
<td>Yes / No</td>
<td>The Lihue Fire Station Aid Station is located less than two miles away</td>
</tr>
</tbody>
</table>
**The Shops at Kukui‘ula**

**Table 4(k): Seabird Light Attraction Minimization Measures Considered at The Shops at Kukui‘ula**

<table>
<thead>
<tr>
<th>Minimization Measures Considered</th>
<th>Feasible? (Y / N)</th>
<th>If not Feasible to Implement Measures, Provide Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Change time of light use (lights off earlier)</td>
<td>Yes / No</td>
<td>Security and safety of employees and guests preclude this option</td>
</tr>
<tr>
<td>▪ Deactivate unnecessary lights</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Replace all outdoor lights with full cut-off fixtures</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Shield all outdoor lights with full cut-off shields</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Angle all lights downward</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Lower intensity (lumens) of outdoor lights</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Change bulb color to non-white spectrum</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Prohibit/control unleashed predatory animals; prohibit outdoor feeding of animals; require sealed rubbish containers</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Provide Worker Seabird Awareness Training to staff</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Provide outreach materials to staff &amp; guests</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Host Save Our Shearwaters (SOS) Aid Station</td>
<td>Yes / No</td>
<td>The Koloa Fire Station Aid Station is located about one quarter mile away</td>
</tr>
</tbody>
</table>
### Waipouli Town Center

**Table 4(l): Seabird Light Attraction Minimization Measures Considered at Waipouli Town Center**

<table>
<thead>
<tr>
<th>Minimization Measures Considered</th>
<th>Feasible? (Y / N)</th>
<th>If not Feasible to Implement Measures, Provide Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Change time of light use (lights off earlier)</td>
<td>Yes / No</td>
<td>Security and safety of employees and guests preclude this option</td>
</tr>
<tr>
<td>▪ Deactivate unnecessary lights</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Replace all outdoor lights with full cut-off fixtures</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Shield all outdoor lights with full cut-off shields</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Angle all lights downward</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Lower intensity (lumens) of outdoor lights</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Change bulb color to non-white spectrum</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Prohibit/control unleashed predatory animals; prohibit outdoor feeding of animals; require sealed rubbish containers</td>
<td>Yes / No</td>
<td>Effective predator control may not be feasible due to a feral cat colony that is being maintained in close proximity to this facility. Outside agencies need to play a role in controlling the feral cats which are known to decimate seabird populations.</td>
</tr>
<tr>
<td>▪ Provide Worker Seabird Awareness Training to staff</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Provide outreach materials to staff &amp; guests</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Host Save Our Shearwaters (SOS) Aid Station</td>
<td>Yes / No</td>
<td>There is an SOS Aid Station at the Kapa’a Fire Station, immediately adjacent to this property</td>
</tr>
</tbody>
</table>
## Table 4(m): Seabird Light Attraction Minimization Measures Considered at Kukui’ula Development - Plantation Core/The Club

<table>
<thead>
<tr>
<th>Minimization Measures Considered</th>
<th>Feasible? (Y / N)</th>
<th>If not Feasible to Implement Measures, Provide Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Change time of light use (lights off earlier)</td>
<td>Yes / No</td>
<td>Security and safety of employees and guests preclude this option</td>
</tr>
<tr>
<td>▪ Deactivate unnecessary lights</td>
<td>Yes / No</td>
<td>This is a relatively new facility designed to be seabird friendly. There are no unnecessary lights to deactivate.</td>
</tr>
<tr>
<td>▪ Replace all outdoor lights with full cut-off fixtures</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Shield all outdoor lights with full cut-off shields</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Angle all lights downward</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Lower intensity (lumens) of outdoor lights</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Change bulb color to non-white spectrum</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Prohibit/control unleashed predatory animals; prohibit outdoor feeding of animals; require sealed rubbish containers</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Provide Worker Seabird Awareness Training to staff</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Provide outreach materials to staff &amp; guests</td>
<td>Yes / No</td>
<td></td>
</tr>
<tr>
<td>▪ Host Save Our Shearwaters (SOS) Aid Station</td>
<td>Yes / No</td>
<td>There is an SOS Aid Station at the Po’ipū Fire Station, located close to this facility</td>
</tr>
</tbody>
</table>
Item 8. **Minimization Plans.** Provide a plan to minimize the effects to the Covered Seabirds due to the Covered Activities. KSHCP Participants will be required to minimize the effects of the Covered Activities to the “maximum extent practicable” per applicable state and federal laws which regulate take license/permit issuance. The KSHCP document provides minimization objectives and measures to follow.

The Minimization Plans should include the proposed minimization measures, timeline, and estimated cost for each facility. In this item, the Participant can include measures already completed or in place (new lights, shields, operational changes). Timeline should include estimated completion schedule, and annual schedule for minimization that will occur only during fledging season.

Minimization measures not yet determined but anticipated to occur at the facility; this section should include an estimated cost that will be earmarked for future minimization measures.

If applicable, the participant must provide the reasoning why certain measures will not be implemented. The suggested table below may each be altered to best describe the Minimization Plan. Attach additional pages, photos, and drawings as needed.
### Table 5(a): Lighting Minimization Measures at Port Allen Solar Farm

<table>
<thead>
<tr>
<th>List of Buildings</th>
<th>Minimization Measures</th>
<th>Cost to Implement</th>
<th>Responsible Staff</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control building</td>
<td>There are two completely shielded LED dark sky compliant lights over the building doors. They are only turned on in the event repairs need to be made at night.</td>
<td>N/A</td>
<td>McBryde Resources, Inc.</td>
<td>Completed</td>
</tr>
</tbody>
</table>
## Port Allen Solar Farm

### Table 6(a): Seabird Mortality Minimization Plan at Port Allen Solar Farm

<table>
<thead>
<tr>
<th>Minimization Measures</th>
<th>Describe minimization method (e.g. trapping, outreach, enact policy)</th>
<th>Cost to Implement</th>
<th>Responsible Staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remove &amp; control loose predatory animals at the facility. (Loose animals can kill grounded seabirds and this measure aims to prevent seabird mortality by animals.)</td>
<td>The facility implements this measure. This is a secure site with no public access.</td>
<td>N/A</td>
<td>Operations</td>
</tr>
<tr>
<td>Prohibit outdoor feeding of predatory animals. (Feeding animals attracts them to the site and this measure aims to reduce the presence of animals that can cause seabird mortality.)</td>
<td>Properties with lights which are normally turned off and rarely or never used, will not be searched.</td>
<td>N/A</td>
<td>Operations</td>
</tr>
<tr>
<td>Conduct nightly/morning searches to recover downed birds at the property &amp; turn them into SOS following protocols (see monitoring plan below).</td>
<td>Training will be provided to staff to ensure their understanding and compliance with minimization measures</td>
<td>N/A</td>
<td>Operations</td>
</tr>
<tr>
<td>Train staff to follow minimization measures.</td>
<td>Train staff to follow minimization measures</td>
<td>N/A</td>
<td>Operations</td>
</tr>
</tbody>
</table>
Port Allen Center I and II  
Table 5(b): Lighting Minimization Measures at Port Allen Center I and II

<table>
<thead>
<tr>
<th>List of Buildings</th>
<th>Minimization Measures</th>
<th>Cost to Implement</th>
<th>Responsible Staff</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two steel commercial buildings</td>
<td>A lighting audit was conducted in 2012. Following that audit the exterior lights were replaced with dark sky compliant fixtures.</td>
<td>N/A</td>
<td>Property Manager</td>
<td>Complete</td>
</tr>
</tbody>
</table>
### Table 6(b): Seabird Mortality Minimization Plan at Port Allen Center I and II

<table>
<thead>
<tr>
<th>Minimization Measures</th>
<th>Describe minimization method (e.g. trapping, outreach, enact policy)</th>
<th>Cost to Implement</th>
<th>Responsible Staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remove &amp; control loose predatory animals at the facility. (Loose animals can kill grounded seabirds and this measure aims to prevent seabird mortality by animals.)</td>
<td>In the event that cats or dogs are reported on the property, county animal control is notified or a pest control company is hired to remove the predators</td>
<td>N/A</td>
<td>Property Manager</td>
</tr>
<tr>
<td>Prohibit outdoor feeding of predatory animals. (Feeding animals attracts them to the site and this measure aims to reduce the presence of animals that can cause seabird mortality.)</td>
<td>Policy enacted</td>
<td>N/A</td>
<td>Property Manager</td>
</tr>
<tr>
<td>Conduct nightly/morning searches to recover downed birds at the property &amp; turn them into SOS following protocols (see monitoring plan below).</td>
<td>Searches will be conducted as per KSHCP guidance</td>
<td>N/A</td>
<td>Property Manager</td>
</tr>
<tr>
<td>Train staff to follow minimization measures.</td>
<td>Training will be conducted annually</td>
<td>N/A</td>
<td>Property Manager</td>
</tr>
</tbody>
</table>
## Port Allen South Parcels

### Table 5(c): Lighting Minimization Measures at Port Allen South Parcels

<table>
<thead>
<tr>
<th>List of Buildings</th>
<th>Minimization Measures</th>
<th>Cost to Implement</th>
<th>Responsible Staff</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shoreline Parcel – no buildings</td>
<td>N/A</td>
<td>N/A</td>
<td>Property Manager</td>
<td>Complete</td>
</tr>
<tr>
<td>BEI Property (three small industrial buildings)</td>
<td>Lighting has been deactivated</td>
<td>N/A</td>
<td>BEI (tenant)</td>
<td>Complete</td>
</tr>
</tbody>
</table>
## Port Allen South Parcels

### Table 6(c): Seabird Mortality Minimization Plan at Port Allen South Parcels

<table>
<thead>
<tr>
<th>Minimization Measures</th>
<th>Describe minimization method (e.g. trapping, outreach, enact policy)</th>
<th>Cost to Implement</th>
<th>Responsible Staff</th>
</tr>
</thead>
</table>
| Remove & control loose predatory animals at the facility. (Loose animals can kill grounded seabirds and this measure aims to prevent seabird mortality by animals.) | Shoreline parcel: Vacant land, no predator control is conducted.  
BEI parcel: In the event that cats or dogs are reported on the property, county animal control is notified or a pest control company is hired to remove the predators | N/A | Property Manager |
| Prohibit outdoor feeding of predatory animals. (Feeding animals attracts them to the site and this measure aims to reduce the presence of animals that can cause seabird mortality.) | Policy enacted | N/A | Property Manager |
| Conduct nightly/morning searches to recover downed birds at the property & turn them into SOS following protocols (see monitoring plan below). | Shoreline parcel: this is an empty lot where no searches are conducted.  
BEI Parcel: searches will be conducted. | N/A | Property Manager |
| Train staff to follow minimization measures. | Empty Lot – no employees to train | N/A | Property Manager |
## Port Allen Parking Lots

**Table 5(d): Lighting Minimization Measures at Port Allen Parking Lots**

<table>
<thead>
<tr>
<th>List of Buildings</th>
<th>Minimization Measures</th>
<th>Cost to Implement</th>
<th>Responsible Staff</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>Streetlights are dark sky compliant</td>
<td>N/A</td>
<td>Property Manager</td>
<td>Complete</td>
</tr>
</tbody>
</table>
Port Allen Parking Lots

Table 6(d): Seabird Mortality Minimization Plan at Port Allen Parking Lots

<table>
<thead>
<tr>
<th>Minimization Measures</th>
<th>Describe minimization method (e.g. trapping, outreach, enact policy)</th>
<th>Cost to Implement</th>
<th>Responsible Staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remove &amp; control loose predatory animals at the facility. (Loose animals can kill grounded seabirds and this measure aims to prevent seabird mortality by animals.)</td>
<td>In the event that cats or dogs are reported on the property, county animal control is notified or a pest control company is hired to remove the predators</td>
<td>N/A</td>
<td>Property Manager</td>
</tr>
<tr>
<td>Prohibit outdoor feeding of predatory animals. (Feeding animals attracts them to the site and this measure aims to reduce the presence of animals that can cause seabird mortality.)</td>
<td>Policy implemented</td>
<td>N/A</td>
<td>Property Manager</td>
</tr>
<tr>
<td>Conduct nightly/morning searches to recover downed birds at the property &amp; turn them into SOS following protocols (see monitoring plan below).</td>
<td>Searches will be conducted as per KSHCP guidance</td>
<td>N/A</td>
<td>Property Manager</td>
</tr>
<tr>
<td>Train staff to follow minimization measures.</td>
<td>Training will be conducted annually</td>
<td>N/A</td>
<td>Property Manager</td>
</tr>
</tbody>
</table>
Port Allen Steel Warehouse

Table 5(e): Lighting Minimization Measures at Port Allen Steel Warehouse

<table>
<thead>
<tr>
<th>List of Buildings</th>
<th>Minimization Measures</th>
<th>Cost to Implement</th>
<th>Responsible Staff</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steel Warehouse</td>
<td>A lighting audit was conducted in 2012, following that audit the exterior lights were replaced with motion activated LED lighting fixtures</td>
<td>N/A</td>
<td>Property Manager</td>
<td>Complete</td>
</tr>
</tbody>
</table>
### Port Allen Steel Warehouse

#### Table 6(e): Seabird Mortality Minimization Plan at Port Allen Steel Warehouse

<table>
<thead>
<tr>
<th>Minimization Measures</th>
<th>Describe minimization method (e.g. trapping, outreach, enact policy)</th>
<th>Cost to Implement</th>
<th>Responsible Staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remove &amp; control loose predatory animals at the facility. (Loose animals can kill grounded seabirds and this measure aims to prevent seabird mortality by animals.)</td>
<td>In the event that cats or dogs are reported on the property, county animal control is notified or a pest control company is hired to remove the predators</td>
<td>N/A</td>
<td>Property Manager</td>
</tr>
<tr>
<td>Prohibit outdoor feeding of predatory animals. (Feeding animals attracts them to the site and this measure aims to reduce the presence of animals that can cause seabird mortality.)</td>
<td>Policy implemented</td>
<td>N/A</td>
<td>Property Manager</td>
</tr>
<tr>
<td>Conduct nightly/morning searches to recover downed birds at the property &amp; turn them into SOS following protocols (see monitoring plan below).</td>
<td>Searches will be conducted as per KSHCP guidance</td>
<td>N/A</td>
<td>Property Manager</td>
</tr>
<tr>
<td>Train staff to follow minimization measures.</td>
<td>Training will be conducted annually</td>
<td>N/A</td>
<td>Property Manager</td>
</tr>
</tbody>
</table>
## Port Allen Marina Center

### Table 5(f): Lighting Minimization Measures at Port Allen Marina Center

<table>
<thead>
<tr>
<th>List of Buildings</th>
<th>Minimization Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>56 low wattage</td>
<td>During the seabird fallout season every other light is turned off at 9:00 pm. Bulbs</td>
</tr>
<tr>
<td>wall sconces</td>
<td>in the fixtures will be changed out to lower wattage bulbs, and if still too bright</td>
</tr>
<tr>
<td>mounted on</td>
<td>plans will be drafted to replace the fixtures.</td>
</tr>
<tr>
<td>building walls</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cost to implement</th>
<th>Responsible Staff</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost for new bulbs is negligible. Cost for new fixtures will be determined by future lighting plan.</td>
<td>Property Manger</td>
<td>Timeline for fixture replacement will be determined by future lighting plan.</td>
</tr>
</tbody>
</table>
**Port Allen Marina Center**

**Table 6(f): Seabird Mortality Minimization Plan at Port Allen Marina Center**

<table>
<thead>
<tr>
<th>Minimization Measures</th>
<th>Describe minimization method (e.g. trapping, outreach, enact policy)</th>
<th>Cost to Implement</th>
<th>Responsible Staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remove &amp; control loose predatory animals at the facility. (Loose animals can kill grounded seabirds and this measure aims to prevent seabird mortality by animals.)</td>
<td>In the event that cats or dogs are reported on the property, county animal control is notified or a pest control company is hired to remove the predators</td>
<td>N/A</td>
<td>Property Manager</td>
</tr>
<tr>
<td>Prohibit outdoor feeding of predatory animals. (Feeding animals attracts them to the site and this measure aims to reduce the presence of animals that can cause seabird mortality.)</td>
<td>Policy implemented</td>
<td>N/A</td>
<td>Property Manager</td>
</tr>
<tr>
<td>Conduct nightly/morning searches to recover downed birds at the property &amp; turn them into SOS following protocols (see monitoring plan below).</td>
<td>Searches will be conducted as per KSHCP guidance</td>
<td>N/A</td>
<td>Property Manager</td>
</tr>
<tr>
<td>Train staff to follow minimization measures.</td>
<td>Training will be conducted annually</td>
<td>N/A</td>
<td>Property Manager</td>
</tr>
</tbody>
</table>
**Pump 3 Hanapepe Valley**

**Table 5(g): Lighting Minimization Measures at Pump 3 Hanapepe Valley**

<table>
<thead>
<tr>
<th>List of Buildings</th>
<th>Minimization Measures</th>
<th>Cost to Implement</th>
<th>Responsible Staff</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Building</td>
<td>One light has been deactivated</td>
<td>N/A</td>
<td>McBryde Resources operator</td>
<td>Complete</td>
</tr>
<tr>
<td>Pump Facility</td>
<td>2 flood lights – not turned on except in emergencies</td>
<td>N/A</td>
<td>McBryde Resources operator</td>
<td>Complete</td>
</tr>
</tbody>
</table>
Pump 3 Hanapepe Valley

Table 6(g): Seabird Mortality Minimization Plan at Pump 3 Hanapepe Valley

<table>
<thead>
<tr>
<th>Minimization Measures</th>
<th>Describe minimization method (e.g. trapping, outreach, enact policy)</th>
<th>Cost to Implement</th>
<th>Responsible Staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remove &amp; control loose predatory animals at the facility. (Loose animals can kill grounded seabirds and this measure aims to prevent seabird mortality by animals.)</td>
<td>In the event that cats or dogs are reported within the fenced facility, county animal control is notified or a pest control company is hired to remove the predators</td>
<td>N/A</td>
<td>McBryde Resources operator</td>
</tr>
<tr>
<td>Prohibit outdoor feeding of predatory animals. (Feeding animals attracts them to the site and this measure aims to reduce the presence of animals that can cause seabird mortality.)</td>
<td>Policy implemented</td>
<td>N/A</td>
<td>McBryde Resources operator</td>
</tr>
<tr>
<td>Conduct nightly/morning searches to recover downed birds at the property &amp; turn them into SOS following protocols (see monitoring plan below).</td>
<td>Properties with lights which are normally turned off and rarely or never used, will not be searched.</td>
<td>N/A</td>
<td>McBryde Resources operator</td>
</tr>
<tr>
<td>Train staff to follow minimization measures.</td>
<td>Training will be conducted annually</td>
<td>N/A</td>
<td>McBryde Sugar operator</td>
</tr>
</tbody>
</table>
## Kalaheo Powerhouse

### Table 5(h): Lighting Minimization Measures at Kalaheo Powerhouse

<table>
<thead>
<tr>
<th>List of Buildings</th>
<th>Minimization Measures</th>
<th>Cost to Implement</th>
<th>Responsible Staff</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 lights</td>
<td>All lights are dark sky complaint or not visible from the sky. They are only turned on in the case of nighttime emergencies.</td>
<td>N/A</td>
<td>McBryde Resource operator</td>
<td>Complete</td>
</tr>
<tr>
<td>2 small wall sconces</td>
<td>These have been deactivated</td>
<td>N/A</td>
<td>McBryde Resources operator</td>
<td>Complete</td>
</tr>
</tbody>
</table>
## Kalaheo Powerhouse

### Table 6(h): Seabird Mortality Minimization Plan at Kalaheo Powerhouse

<table>
<thead>
<tr>
<th>Minimization Measures</th>
<th>Describe minimization method (e.g. trapping, outreach, enact policy)</th>
<th>Cost to Implement</th>
<th>Responsible Staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remove &amp; control loose predatory animals at the facility. (Loose animals can kill</td>
<td>In the event that cats or dogs are reported on the property, a pest control company will be hired to remove the predators</td>
<td>N/A</td>
<td>McBryde Resources operator</td>
</tr>
<tr>
<td>grounded seabirds and this measure aims to prevent seabird mortality by animals.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prohibit outdoor feeding of predatory animals. (Feeding animals attracts them to the</td>
<td>Policy implemented</td>
<td>N/A</td>
<td>McBryde Resources operator</td>
</tr>
<tr>
<td>site and this measure aims to reduce the presence of animals that can cause seabird</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>mortality.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conduct nightly/morning searches to recover downed birds at the property &amp; turn them</td>
<td>Properties with lights which are normally turned off and rarely or never used, will not be searched.</td>
<td>N/A</td>
<td>McBryde Resources operator</td>
</tr>
<tr>
<td>into SOS following protocols (see monitoring plan below).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Train staff to follow minimization measures.</td>
<td>Training will be conducted annually</td>
<td>N/A</td>
<td>McBryde Resources operator</td>
</tr>
</tbody>
</table>
### Wainiha Powerhouse

#### Table 5(i): Lighting Minimization Measures at Wainiha Powerhouse

<table>
<thead>
<tr>
<th>List of Buildings</th>
<th>Minimization Measures</th>
<th>Cost to Implement</th>
<th>Responsible Staff</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Powerhouse wall lights (3)</td>
<td>All lights are full-cutoff, dark sky compliant fixtures that were recently replaced. They are not turned on except in the event of a nighttime emergency.</td>
<td>N/A</td>
<td>McBryde Resources operator</td>
<td>Complete</td>
</tr>
</tbody>
</table>
Wainiha Powerhouse

Table 6(i): Seabird Mortality Minimization Plan at Wainiha Powerhouse

<table>
<thead>
<tr>
<th>Minimization Measures</th>
<th>Describe minimization method (e.g. trapping, outreach, enact policy)</th>
<th>Cost to Implement</th>
<th>Responsible Staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remove &amp; control loose predatory animals at the facility.</td>
<td>In the event that cats or dogs are reported within the fenced facility, county animal control is notified or a pest control company is hired to remove the predators</td>
<td>N/A</td>
<td>McBryde Resources operator</td>
</tr>
<tr>
<td>Prohibit outdoor feeding of predatory animals.</td>
<td>Policy implemented</td>
<td>N/A</td>
<td>McBryde Resources operator</td>
</tr>
<tr>
<td>Conduct nightly/morning searches to recover downed birds at the property &amp; turn them</td>
<td>Properties with lights which are normally turned off and rarely or never used, will not be searched.</td>
<td>N/A</td>
<td>McBryde Resources operator</td>
</tr>
<tr>
<td>into SOS following protocols (see monitoring plan below).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Train staff to follow minimization measures.</td>
<td>Training will be conducted annually</td>
<td>N/A</td>
<td>McBryde Resources operator</td>
</tr>
</tbody>
</table>
### Table 5(j): Lighting Minimization Measures at Hokulei Shopping Village

<table>
<thead>
<tr>
<th>List of Buildings</th>
<th>Minimization Measures</th>
<th>Cost to Implement</th>
<th>Responsible Staff</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shopping Center</td>
<td>This is a new shopping center which was designed to have dark sky compliant lighting</td>
<td>N/A</td>
<td>Property Manager</td>
<td>Complete</td>
</tr>
<tr>
<td></td>
<td>There are six emergency exit lights which are not totally shielded, but are only turned on when there is an emergency and a power outage</td>
<td>N/A</td>
<td>Property Manager</td>
<td>Complete</td>
</tr>
</tbody>
</table>
Hokulei Shopping Village

Table 6(j): Seabird Mortality Minimization Plan at Hokulei Shopping Village

<table>
<thead>
<tr>
<th>Minimization Measures</th>
<th>Describe minimization method (e.g. trapping, outreach, enact policy)</th>
<th>Cost to Implement</th>
<th>Responsible Staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remove &amp; control loose predatory animals at the facility. (Loose animals can kill grounded seabirds and this measure aims to prevent seabird mortality by animals.)</td>
<td>In the event that cats or dogs are reported on the property, county animal control is notified or a pest control company is hired to remove the predators</td>
<td>N/A</td>
<td>Property Manager</td>
</tr>
<tr>
<td>Prohibit outdoor feeding of predatory animals. (Feeding animals attracts them to the site and this measure aims to reduce the presence of animals that can cause seabird mortality.)</td>
<td>Policy implemented</td>
<td>N/A</td>
<td>Property Manager</td>
</tr>
<tr>
<td>Conduct nightly/morning searches to recover downed birds at the property &amp; turn them into SOS following protocols (see monitoring plan below).</td>
<td>Searches will be conducted as per KSHCP guidance</td>
<td>N/A</td>
<td>Property Manager</td>
</tr>
<tr>
<td>Train staff to follow minimization measures.</td>
<td>Training will be conducted annually</td>
<td>N/A</td>
<td>Property Manager</td>
</tr>
</tbody>
</table>
### The Shops at Kukui‘ula

**Table 5(k): Lighting Minimization Measures at The Shops at Kukui‘ula**

<table>
<thead>
<tr>
<th>List of Buildings</th>
<th>Minimization Measures</th>
<th>Cost to Implement</th>
<th>Responsible Staff</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>67 LED Streetlights</td>
<td>These fixtures are full cutoff dark sky compliant</td>
<td>N/A</td>
<td>Property Manager</td>
<td>Complete</td>
</tr>
<tr>
<td>6 Flat panel LED Parking Lights</td>
<td>These fixtures are full cutoff dark sky compliant</td>
<td>N/A</td>
<td>Property Manager</td>
<td>Complete</td>
</tr>
<tr>
<td>Numerous shop lighting fixtures</td>
<td>Management and ownership are developing a lighting plan to address fixtures that are not currently dark sky compliant</td>
<td>Cost for new fixtures will be determined by future lighting plan.</td>
<td>Property Manager</td>
<td>Timeline for fixture replacement will be determined by future lighting plan.</td>
</tr>
</tbody>
</table>

**DRAFT**

KSHCP-PIP Alexander & Baldwin
### The Shops at Kukuiʻula

**Table 6(k): Seabird Mortality Minimization Plan at The Shops at Kukuiʻula**

<table>
<thead>
<tr>
<th>Minimization Measures</th>
<th>Describe minimization method (e.g. trapping, outreach, enact policy)</th>
<th>Cost to Implement</th>
<th>Responsible Staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remove &amp; control loose predatory animals at the facility. (Loose animals can kill grounded seabirds and this measure aims to prevent seabird mortality by animals.)</td>
<td>In the event that cats or dogs are reported on the property, county animal control is notified or a pest control company is hired to remove the predators</td>
<td>N/A</td>
<td>Property Manager</td>
</tr>
<tr>
<td>Prohibit outdoor feeding of predatory animals. (Feeding animals attracts them to the site and this measure aims to reduce the presence of animals that can cause seabird mortality.)</td>
<td>Policy implemented</td>
<td>N/A</td>
<td>Property Manager</td>
</tr>
<tr>
<td>Conduct nightly/morning searches to recover downed birds at the property &amp; turn them into SOS following protocols (see monitoring plan below).</td>
<td>Searches will be conducted as per KSHCP guidance</td>
<td>N/A</td>
<td>Property Manager</td>
</tr>
<tr>
<td>Train staff to follow minimization measures.</td>
<td>Training will be conducted annually</td>
<td>N/A</td>
<td>Property Manager</td>
</tr>
</tbody>
</table>
Waipouli Town Center

Table 5(l): Lighting Minimization Measures at Waipouli Town Center

<table>
<thead>
<tr>
<th>List of Buildings</th>
<th>Minimization Measures</th>
<th>Cost to Implement</th>
<th>Responsible Staff</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shopping Center</td>
<td>All of the lights at this newly purchased shopping center are dark sky compliant. Any replacement of older fixtures will be done with dark sky full cutoff fixtures.</td>
<td>N/A</td>
<td>Property Manager</td>
<td>Complete</td>
</tr>
</tbody>
</table>
### Waipouli Town Center

**Table 6(l): Seabird Mortality Minimization Plan at Waipouli Town Center**

<table>
<thead>
<tr>
<th>Minimization Measures</th>
<th>Describe minimization method (e.g. trapping, outreach, enact policy)</th>
<th>Cost to Implement</th>
<th>Responsible Staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remove &amp; control loose predatory animals at the facility. (Loose animals can kill grounded seabirds and this measure aims to prevent seabird mortality by animals.)</td>
<td>Effective predator control at this property is not possible unless action is taken by outside agencies to discourage ongoing maintenance of a feral cat population immediately adjacent to the property. Until that time, predator control will be limited to dogs, and in the event dogs are reported on the property, county animal control is notified or a pest control company is hired to remove the predators.</td>
<td>N/A</td>
<td>Property Manager</td>
</tr>
<tr>
<td>Prohibit outdoor feeding of predatory animals. (Feeding animals attracts them to the site and this measure aims to reduce the presence of animals that can cause seabird mortality.)</td>
<td>Policy implemented</td>
<td>N/A</td>
<td>Property Manager</td>
</tr>
<tr>
<td>Conduct nightly/morning searches to recover downed birds at the property &amp; turn them into SOS following protocols (see monitoring plan below).</td>
<td>Searches will be conducted as per KSHCP guidance</td>
<td>N/A</td>
<td>Property Manager</td>
</tr>
<tr>
<td>Train staff to follow minimization measures.</td>
<td>Training will be conducted annually</td>
<td>N/A</td>
<td>Property Manager</td>
</tr>
</tbody>
</table>
**Kukui‘ula Development (Plantation Core/The Club)**

**Table 5(m): Lighting Minimization Measures at Kukui‘ula Development (Plantation Core/The Club)**

<table>
<thead>
<tr>
<th>List of Buildings</th>
<th>Minimization Measures</th>
<th>Cost to Implement</th>
<th>Responsible Staff</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parking Lots</td>
<td>All lighting is fully shielded, low wattage, and dark sky compliant</td>
<td>N/A</td>
<td>Engineering Senior Manager</td>
<td>Complete</td>
</tr>
<tr>
<td>Cart Barn and Mechanicals</td>
<td>Wall lights are low wattage LEDs, masked by vegetation. The two downward pointing CFL floods at the loading dock are under eves and are only turned on when needed.</td>
<td>N/A</td>
<td>Engineering Senior Manager</td>
<td>Complete</td>
</tr>
<tr>
<td>Porte Cochere</td>
<td>All lighting is fully shielded, low wattage and dark sky compliant</td>
<td>N/A</td>
<td>Engineering Senior Manager</td>
<td>Complete</td>
</tr>
<tr>
<td>Kukui‘ula Realty</td>
<td>All lighting is fully shielded, low wattage and dark sky compliant</td>
<td>N/A</td>
<td>Engineering Senior Manager</td>
<td>Complete</td>
</tr>
<tr>
<td>Swimming Pool</td>
<td>All lighting is the lowest wattage necessary for human safety and security.</td>
<td>N/A</td>
<td>Engineering Senior Manager</td>
<td>Complete</td>
</tr>
<tr>
<td>Swimming Pool</td>
<td>All lighting is the lowest wattage necessary for human safety and security.</td>
<td>N/A</td>
<td>Engineering Senior Manager</td>
<td>Complete</td>
</tr>
<tr>
<td>Swimming Pool</td>
<td>All lighting is the lowest wattage necessary for human safety and security.</td>
<td>N/A</td>
<td>Engineering Senior Manager</td>
<td>Complete</td>
</tr>
<tr>
<td>Swimming Pool</td>
<td>All lighting is the lowest wattage necessary for human safety and security.</td>
<td>N/A</td>
<td>Engineering Senior Manager</td>
<td>Complete</td>
</tr>
<tr>
<td>Swimming Pool</td>
<td>All lighting is the lowest wattage necessary for human safety and security.</td>
<td>N/A</td>
<td>Engineering Senior Manager</td>
<td>Complete</td>
</tr>
<tr>
<td>Swimming Pool</td>
<td>All lighting is the lowest wattage necessary for human safety and security.</td>
<td>N/A</td>
<td>Engineering Senior Manager</td>
<td>Complete</td>
</tr>
<tr>
<td>Swimming Pool</td>
<td>All lighting is the lowest wattage necessary for human safety and security.</td>
<td>N/A</td>
<td>Engineering Senior Manager</td>
<td>Complete</td>
</tr>
<tr>
<td>Swimming Pool</td>
<td>All lighting is the lowest wattage necessary for human safety and security.</td>
<td>N/A</td>
<td>Engineering Senior Manager</td>
<td>Complete</td>
</tr>
<tr>
<td>Swimming Pool</td>
<td>All lighting is the lowest wattage necessary for human safety and security.</td>
<td>N/A</td>
<td>Engineering Senior Manager</td>
<td>Complete</td>
</tr>
</tbody>
</table>
### Kukui‘ula Development (Plantation Core/The Club)

#### Table 6(m): Seabird Mortality Minimization Plan at Kukui‘ula Development (Plantation Core/The Club)

<table>
<thead>
<tr>
<th>Minimization Measures</th>
<th>Describe minimization method (e.g. trapping, outreach, enact policy)</th>
<th>Cost to Implement</th>
<th>Responsible Staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remove &amp; control loose predatory animals at the facility. (Loose animals can kill grounded seabirds and this measure aims to prevent seabird mortality by animals.)</td>
<td>In the event that cats or dogs are reported on the property, county animal control is notified or a pest control company is hired to remove the predators.</td>
<td>N/A</td>
<td>Property Manager</td>
</tr>
<tr>
<td>Prohibit outdoor feeding of predatory animals. (Feeding animals attracts them to the site and this measure aims to reduce the presence of animals that can cause seabird mortality.)</td>
<td>Policy implemented</td>
<td>N/A</td>
<td>Property Manager</td>
</tr>
<tr>
<td>Conduct nightly/morning searches to recover downed birds at the property &amp; turn them into SOS following protocols (see monitoring plan below).</td>
<td>Searches will be conducted as per KSHCP guidance</td>
<td>N/A</td>
<td>Property Manager</td>
</tr>
<tr>
<td>Train staff to follow minimization measures.</td>
<td>Training will be conducted annually</td>
<td>N/A</td>
<td>Property Manager</td>
</tr>
</tbody>
</table>
Item 9. Take Monitoring Plan. Provide a plan to monitor take of the Covered Seabirds at the facilities proposed to be covered by the incidental take permit/license. The take monitoring plan describes how the property will be searched for downed Covered Seabirds. The KSHCP document provides standards and guidelines for take monitoring to ensure that take of the species is accurately measured and recorded. The regulatory agencies will make the final determination as to the adequacy of the take monitoring plan.

Take monitoring is described in Tables 7(a) through 7(m), below. Additionally, Standard Operating Procedures are included as Appendix C.
Port Allen Solar Farm

Table 7(a): Covered Seabird Take Monitoring Protocols at Port Allen Solar Farm

<table>
<thead>
<tr>
<th>Item</th>
<th>Protocol (fill in protocol &amp; provide reasons)</th>
<th>KSHCP Guideline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage of the total property that will be searched &amp; the total area to be searched</td>
<td>There are only two small full cutoff dark sky light fixtures on the control building. They are only illuminated in the case of a nighttime emergency requiring service in the control building. The site will therefore not be searched for downed birds.</td>
<td>Search as much area as possible</td>
</tr>
<tr>
<td>Frequency of searches (# per day or per week)</td>
<td>N/A</td>
<td>Twice daily</td>
</tr>
<tr>
<td>Time of day of searches</td>
<td>N/A</td>
<td>2-3 hours after sunset, and within 3 hours after sunrise</td>
</tr>
<tr>
<td>Number of searchers per search area</td>
<td>N/A</td>
<td>Depends on site conditions and safety considerations and vegetation, nearby hazards/threats</td>
</tr>
<tr>
<td>Proposed training</td>
<td>Seabird Awareness training will be conducted for employees and operators once a year. See Appendix B1.</td>
<td>Annual training covering seabird identification, seabird handling, response procedures, verified and documented</td>
</tr>
</tbody>
</table>
### Port Allen Center I and II

#### Table 7(b): Covered Seabird Take Monitoring Protocols at Port Allen Center I and II

<table>
<thead>
<tr>
<th>Item</th>
<th>Protocol (fill in protocol &amp; provide reasons)</th>
<th>KSHCP Guideline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage of the total property that will be searched &amp; the total area to be searched</td>
<td>100%</td>
<td>Search as much area as possible</td>
</tr>
<tr>
<td>Frequency of searches (# per day or per week)</td>
<td>Twice daily</td>
<td>Twice daily</td>
</tr>
<tr>
<td>Time of day of searches</td>
<td>2-3 hours after sunset, and within 3 hours after sunrise</td>
<td>2-3 hours after sunset, and within 3 hours after sunrise</td>
</tr>
<tr>
<td>Number of searchers per search area</td>
<td>1-2 searches, depending on safety considerations</td>
<td>Depends on site conditions and safety considerations and vegetation, nearby hazards/threats</td>
</tr>
<tr>
<td>Proposed training</td>
<td>Seabird Awareness training will be conducted for employees and operators once a year. See Appendix B1.</td>
<td>Annual training covering seabird identification, seabird handling, response procedures, verified and documented</td>
</tr>
</tbody>
</table>
Port Allen South Parcels

Table 7(c): Covered Seabird Take Monitoring Protocols at Port Allen South Parcels

<table>
<thead>
<tr>
<th>Item</th>
<th>Protocol (fill in protocol &amp; provide reasons)</th>
<th>KSHCP Guideline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage of the total property that will be searched &amp; the total area to be searched</td>
<td>Shoreline Parcel will not be searched as there are no lights associated with it</td>
<td>Search as much area as possible</td>
</tr>
<tr>
<td>Frequency of searches (# per day or per week)</td>
<td>The BEI parcel will be searched twice daily</td>
<td>Twice daily</td>
</tr>
<tr>
<td>Time of day of searches</td>
<td>The BEI parcel will be searched 2-3 hours after sunset, and within 3 hours after sunrise</td>
<td>2-3 hours after sunset, and within 3 hours after sunrise</td>
</tr>
<tr>
<td>Number of searchers per search area</td>
<td>One searcher for the BEI parcel</td>
<td>Depends on site conditions and safety considerations and vegetation, nearby hazards/threats</td>
</tr>
<tr>
<td>Proposed training</td>
<td>Seabird Awareness training will be conducted for employees and operators once a year. See Appendix B1.</td>
<td>Annual training covering seabird identification, seabird handling, response procedures, verified and documented</td>
</tr>
</tbody>
</table>
Port Allen Parking Lots  
**Table 7(d): Covered Seabird Take Monitoring Protocols at Port Allen Parking Lots**

<table>
<thead>
<tr>
<th>Item</th>
<th>Protocol (fill in protocol &amp; provide reasons)</th>
<th>KSHCP Guideline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage of the total property that will be searched &amp; the total area to be searched</td>
<td>100%</td>
<td>Search as much area as possible</td>
</tr>
<tr>
<td>Frequency of searches (# per day or per week)</td>
<td>Twice daily</td>
<td>Twice daily</td>
</tr>
<tr>
<td>Time of day of searches</td>
<td>2-3 hours after sunset, and within 3 hours after sunrise</td>
<td>2-3 hours after sunset, and within 3 hours after sunrise</td>
</tr>
<tr>
<td>Number of searchers per search area</td>
<td>One</td>
<td>Depends on site conditions and safety considerations and vegetation, nearby hazards/threats</td>
</tr>
<tr>
<td>Proposed training</td>
<td>Seabird Awareness training will be conducted for employees and operators once a year. See Appendix B1.</td>
<td>Annual training covering seabird identification, seabird handling, response procedures, verified and documented</td>
</tr>
</tbody>
</table>
Port Allen Steel Warehouse

Table 7(e): Covered Seabird Take Monitoring Protocols at Port Allen Steel Warehouse

<table>
<thead>
<tr>
<th>Item</th>
<th>Protocol (fill in protocol &amp; provide reasons)</th>
<th>KSHCP Guideline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage of the total property that will be searched &amp; the total area to be searched</td>
<td>Approximately 80% of the property will be searched. Due to high crime, one tenant maintains watchdogs within his fenced yard, rendering about 20% of the property inaccessible to searchers.</td>
<td>Search as much area as possible</td>
</tr>
<tr>
<td>Frequency of searches (# per day or per week)</td>
<td>Twice daily</td>
<td>Twice daily</td>
</tr>
<tr>
<td>Time of day of searches</td>
<td>2-3 hours after sunset, and within 3 hours after sunrise</td>
<td>2-3 hours after sunset, and within 3 hours after sunrise</td>
</tr>
<tr>
<td>Number of searchers per search area</td>
<td>One</td>
<td>Depends on site conditions and safety considerations and vegetation, nearby hazards/threats</td>
</tr>
<tr>
<td>Proposed training</td>
<td>Seabird Awareness training will be conducted for employees and operators once a year. See Appendix B1.</td>
<td>Annual training covering seabird identification, seabird handling, response procedures, verified and documented</td>
</tr>
</tbody>
</table>
Port Allen Marina Center  
Table 7(f): Covered Seabird Take Monitoring Protocols at Port Allen Marina Center  

<table>
<thead>
<tr>
<th>Item</th>
<th>Protocol (fill in protocol &amp; provide reasons)</th>
<th>KSHCP Guideline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage of the total property that will be searched &amp; the total</td>
<td>100% of this site is searchable, as it is paved or built on</td>
<td>Search as much area as possible</td>
</tr>
<tr>
<td>area to be searched</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency of searches (# per day or per week)</td>
<td>Twice daily</td>
<td>Twice daily</td>
</tr>
<tr>
<td>Time of day of searches</td>
<td>2-3 hours after sunset, and within 3 hours after sunrise</td>
<td>2-3 hours after sunset, and within 3 hours after sunrise</td>
</tr>
<tr>
<td>Number of searchers per search area</td>
<td>One</td>
<td>Depends on site conditions and safety considerations and vegetation, nearby</td>
</tr>
<tr>
<td></td>
<td></td>
<td>hazards/threats</td>
</tr>
<tr>
<td>Proposed training</td>
<td>Seabird Awareness training will be conducted for employees and operators once a year. See Appendix B1.</td>
<td>Annual training covering seabird identification, seabird handling, response</td>
</tr>
<tr>
<td></td>
<td></td>
<td>procedures, verified and documented</td>
</tr>
</tbody>
</table>
### Pump 3 Hanapepe Valley

**Table 7(g): Covered Seabird Take Monitoring Protocols at Pump 3 Hanapepe Valley**

<table>
<thead>
<tr>
<th>Item</th>
<th>Protocol (fill in protocol &amp; provide reasons)</th>
<th>KSHCP Guideline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage of the total property that will be searched &amp; the total area to be searched</td>
<td>Properties with lights which are normally turned off and rarely or never used, will not be searched.</td>
<td>Search as much area as possible</td>
</tr>
<tr>
<td>Frequency of searches (# per day or per week)</td>
<td>N/A</td>
<td>Twice daily</td>
</tr>
<tr>
<td>Time of day of searches</td>
<td>N/A</td>
<td>2-3 hours after sunset, and within 3 hours after sunrise</td>
</tr>
<tr>
<td>Number of searchers per search area</td>
<td>One</td>
<td>Depends on site conditions and safety considerations and vegetation, nearby hazards/threats</td>
</tr>
<tr>
<td>Proposed training</td>
<td>Seabird Awareness training will be conducted for employees and operators once a year. See Appendix B1.</td>
<td>Annual training covering seabird identification, seabird handling, response procedures, verified and documented</td>
</tr>
</tbody>
</table>
### Kalaheo Powerhouse

**Table 7(h): Covered Seabird Take Monitoring Protocols at Kalaheo Powerhouse**

<table>
<thead>
<tr>
<th>Item</th>
<th>Protocol (fill in protocol &amp; provide reasons)</th>
<th>KSHCP Guideline</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Percentage of the total property that will be searched &amp; the total area to be searched</strong></td>
<td>Properties with lights which are normally turned off and rarely or never used, will not be searched.</td>
<td>Search as much area as possible</td>
</tr>
<tr>
<td><strong>Frequency of searches (# per day or per week)</strong></td>
<td>N/A</td>
<td>Twice daily</td>
</tr>
<tr>
<td><strong>Time of day of searches</strong></td>
<td>N/A</td>
<td>2-3 hours after sunset, and within 3 hours after sunrise</td>
</tr>
<tr>
<td><strong>Number of searchers per search area</strong></td>
<td>One</td>
<td>Depends on site conditions and safety considerations and vegetation, nearby hazards/threats</td>
</tr>
<tr>
<td><strong>Proposed training</strong></td>
<td>Seabird Awareness training will be conducted for employees and operators once a year. See Appendix B1.</td>
<td>Annual training covering seabird identification, seabird handling, response procedures, verified and documented</td>
</tr>
</tbody>
</table>
**Wainiha Powerhouse**  
**Table 7(i): Covered Seabird Take Monitoring Protocols at Wainiha Powerhouse**

<table>
<thead>
<tr>
<th>Item</th>
<th>Protocol (fill in protocol &amp; provide reasons)</th>
<th>KSHCP Guideline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage of the total property that will be searched &amp; the total area to be searched</td>
<td>Properties with lights which are normally turned off and rarely or never used, will not be searched.</td>
<td>Search as much area as possible</td>
</tr>
<tr>
<td>Frequency of searches (# per day or per week)</td>
<td>N/A</td>
<td>Twice daily</td>
</tr>
<tr>
<td>Time of day of searches</td>
<td>N/A</td>
<td>2-3 hours after sunset, and within 3 hours after sunrise</td>
</tr>
<tr>
<td>Number of searchers per search area</td>
<td>One</td>
<td>Depends on site conditions and safety considerations and vegetation, nearby hazards/threats</td>
</tr>
<tr>
<td>Proposed training</td>
<td>Seabird Awareness training will be conducted for employees and operators once a year. See Appendix B1.</td>
<td>Annual training covering seabird identification, seabird handling, response procedures, verified and documented</td>
</tr>
</tbody>
</table>
### Table 7(j): Covered Seabird Take Monitoring Protocols at Hokulei Shopping Village

Please provide the following information for the protocol items below

<table>
<thead>
<tr>
<th>Item</th>
<th>Protocol (fill in protocol &amp; provide reasons)</th>
<th>KSHCP Guideline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage of the total property that will be searched &amp; the total area to be searched</td>
<td>100% of this site is searchable</td>
<td>Search as much area as possible</td>
</tr>
<tr>
<td>Frequency of searches (# per day or per week)</td>
<td>A minimum of twice daily</td>
<td>Twice daily</td>
</tr>
<tr>
<td>Time of day of searches</td>
<td>2-3 hours after sunset, and within 3 hours after sunrise</td>
<td>2-3 hours after sunset, and within 3 hours after sunrise</td>
</tr>
<tr>
<td>Number of searchers per search area</td>
<td>One to three</td>
<td>Depends on site conditions and safety considerations and vegetation, nearby hazards/threats</td>
</tr>
<tr>
<td>Proposed training</td>
<td>Seabird Awareness training will be conducted for employees and operators once a year. See Appendix B1.</td>
<td>Annual training covering seabird identification, seabird handling, response procedures, verified and documented</td>
</tr>
</tbody>
</table>
## The Shops at Kukui‘ula

### Table 7(k): Covered Seabird Take Monitoring Protocols at The Shops at Kukui‘ula

<table>
<thead>
<tr>
<th>Item</th>
<th>Protocol (fill in protocol &amp; provide reasons)</th>
<th>KSHCP Guideline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage of the total property that will be searched &amp; the total area to be searched</td>
<td>100% of this site is searchable</td>
<td>Search as much area as possible</td>
</tr>
<tr>
<td>Frequency of searches (# per day or per week)</td>
<td>A minimum of twice daily</td>
<td>Twice daily</td>
</tr>
<tr>
<td>Time of day of searches</td>
<td>2-3 hours after sunset, and within 3 hours after sunrise</td>
<td>2-3 hours after sunset, and within 3 hours after sunrise</td>
</tr>
<tr>
<td>Number of searchers per search area</td>
<td>One to three</td>
<td>Depends on site conditions and safety considerations and vegetation, nearby hazards/threats</td>
</tr>
<tr>
<td>Proposed training</td>
<td>Seabird Awareness training will be conducted for employees and operators once a year. See Appendix B1.</td>
<td>Annual training covering seabird identification, seabird handling, response procedures, verified and documented</td>
</tr>
</tbody>
</table>
Waipouli Town Center

Table 7(I): Covered Seabird Take Monitoring Protocols at Waipouli Town Center

<table>
<thead>
<tr>
<th>Item</th>
<th>Protocol (fill in protocol &amp; provide reasons)</th>
<th>KSHCP Guideline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage of the total property that will be searched &amp; the total area to be searched</td>
<td>100% of this site is searchable as it is paved or built on</td>
<td>Search as much area as possible</td>
</tr>
<tr>
<td>Frequency of searches (# per day or per week)</td>
<td>A minimum of twice daily</td>
<td>Twice daily</td>
</tr>
<tr>
<td>Time of day of searches</td>
<td>2-3 hours after sunset, and within 3 hours after sunrise</td>
<td>2-3 hours after sunset, and within 3 hours after sunrise</td>
</tr>
<tr>
<td>Number of searchers per search area</td>
<td>One to three</td>
<td>Depends on site conditions and safety considerations and vegetation, nearby hazards/threats</td>
</tr>
<tr>
<td>Proposed training</td>
<td>Seabird Awareness training will be conducted for employees and operators once a year. See Appendix B1.</td>
<td>Annual training covering seabird identification, seabird handling, response procedures, verified and documented</td>
</tr>
</tbody>
</table>
Table 7(m): Covered Seabird Take Monitoring Protocols at Kukuiʻula Development (Plantation Core/The Club)

<table>
<thead>
<tr>
<th>Please provide the following information for the protocol items below</th>
<th>Protocol (fill in protocol &amp; provide reasons)</th>
<th>KSHCP Guideline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage of the total property that will be searched &amp; the total area to be searched</td>
<td>100% of this site is searchable</td>
<td>Search as much area as possible</td>
</tr>
<tr>
<td>Frequency of searches (# per day or per week)</td>
<td>A minimum of twice daily</td>
<td>Twice daily</td>
</tr>
<tr>
<td>Time of day of searches</td>
<td>2-3 hours after sunset, and within 3 hours after sunrise</td>
<td>2-3 hours after sunset, and within 3 hours after sunrise</td>
</tr>
<tr>
<td>Number of searchers per search area</td>
<td>One to three</td>
<td>Depends on site conditions and safety considerations and vegetation, nearby hazards/threats</td>
</tr>
<tr>
<td>Proposed training</td>
<td>Seabird Awareness training will be conducted for employees and operators once a year. See Appendix B1.</td>
<td>Annual training covering seabird identification, seabird handling, response procedures, verified and documented</td>
</tr>
</tbody>
</table>
Item 10. Components of the Green Sea Turtle Minimization and Monitoring Plan (if required). Monitoring and minimization for the Green Sea Turtle is in two parts: A) Monitoring to detect nests and B) Monitoring and minimizing impacts to nests detected.

Part A: Monitoring to detect Green Sea Turtle Nests
Please provide the following information; the table below may be used and altered as needed.

1) Detailed location and description of beaches, including linear distance, at which searching for nests of the green sea turtle will take place. Searches should take place at any beach from which light at the facility can be viewed;

2) Monitoring protocols indicating:
   a) Annual training of searchers;
   b) Frequency of searches;
   c) Conduct active searching (searching the beach width);
   d) Sufficient number of trained searchers to cover the area; and
   e) Record results of search monitoring.

3) All Participants are required to record the results of search efforts. Records should provide:
   a) Evidence (what was seen). Include description and provide photographs
   b) Location on the beach (GPS) and physically mark the location if possible
   c) Date and time of day
   d) Description of surrounding land use (e.g., vacant, or developed), and
   e) Proximity to the facility.

Part B: Monitoring of Identified Green Sea Turtle Nests

Each identified nest of the green sea turtle should be monitored and protected from light attraction. Please provide the following monitoring protocols; the tables below may be used and altered as needed.

1. Light avoidance measure for identified nests (either shield/deactivate lights at the facility or install and maintain a light shield around each identified nest);
2. Frequency of searches;
3. Number of searches monitoring the nests. The number of needed to monitor active nests will depend on number of nests identified and amount of beach needed to be covered;
4. Record the results of nest monitoring. Monitoring should provide:
   a. Evidence of hatchling emergence (description and photos):
   b. Date and time of emergence,
   c. Direction of tracks,
   d. Condition of the nest area (e.g., disturbed or not).

Coverage for take of Green Sea Turtle (Honu) is not being sought under this application.
<table>
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**Port Allen Solar Farm**

**Table 9(a): Green Sea Turtle Monitoring Protocols – Part B: Monitoring of Identified Nests & Minimization for Port Allen Solar Farm**

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Please provide search protocols to monitor identified nests (from Part A) of the green sea turtle (Attach pages as needed)
Port Allen Center I and II
Table 8(b): Green Sea Turtle Monitoring Protocols – Part A: Monitoring to Detect Nests at Port Allen Center I and II

Please provide search protocols for detecting nests of the green sea turtle (Attach pages as needed)

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Port Allen Center I and II

Table 9(b): Green Sea Turtle Monitoring Protocols – Part B: Monitoring of Identified Nests & Minimization for Port Allen Center I and II

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**Port Allen South Parcels**

Table 8(c): Green Sea Turtle Monitoring Protocols – Part A: Monitoring to Detect Nests at Port Allen South Parcels

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Port Allen South Parcels
Table 9(c): Green Sea Turtle Monitoring Protocols – Part B: Monitoring of Identified Nests & Minimization for Port Allen South Parcels

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**Port Allen Parking Lots**

**Table 8(d): Green Sea Turtle Monitoring Protocols – Part A: Monitoring to Detect Nests at Port Allen Parking Lots**

Please provide search protocols for detecting nests of the *green sea turtle* (Attach pages as needed)

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Port Allen Parking Lots

Table 9(d): Green Sea Turtle Monitoring Protocols – Part B: Monitoring of Identified Nests & Minimization for Port Allen Parking Lots

Please provide search protocols to monitor identified nests (from Part A) of the green sea turtle (Attach pages as needed)

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Port Allen Steel Warehouse
Table 8(e): Green Sea Turtle Monitoring Protocols – Part A: Monitoring to Detect Nests at Port Allen Steel Warehouse

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Please provide search protocols for detecting nests of the green sea turtle (Attach pages as needed)

KSHCP-PIP Alexander & Baldwin
Port Allen Steel Warehouse
Table 9(e): Green Sea Turtle Monitoring Protocols – Part B: Monitoring of Identified Nests & Minimization for Port Allen Steel Warehouse

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Port Allen Marina Center  
Table 8(f): Green Sea Turtle Monitoring Protocols – Part A: Monitoring to Detect Nests at Port Allen Marina Center

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Port Allen Marina Center
Table 9(f): Green Sea Turtle Monitoring Protocols – Part B: Monitoring of Identified Nests & Minimization for Port Allen Marina Center

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Please provide search protocols for detecting nests of the green sea turtle (Attach pages as needed)

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Pump 3 Hanapepe Valley

Table 9(g): Green Sea Turtle Monitoring Protocols – Part B: Monitoring of Identified Nests & Minimization for Pump 3 Hanapepe Valley

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Kalaheo Powerhouse

Table 8(h): Green Sea Turtle Monitoring Protocols – Part A: Monitoring to Detect Nests at Kalaheo Powerhouse

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### Table 9(h): Green Sea Turtle Monitoring Protocols – Part B: Monitoring of Identified Nests & Minimization for Kalaheo Powerhouse

Please provide search protocols to monitor identified nests (from Part A) of the green sea turtle (Attach pages as needed)

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**Wainiha Powerhouse**

**Table 8(i): Green Sea Turtle Monitoring Protocols – Part A: Monitoring to Detect Nests at Wainiha Powerhouse**

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Table 9(i): Green Sea Turtle Monitoring Protocols – Part B: Monitoring of Identified Nests & Minimization for Wainiha Powerhouse

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Hokulei Shopping Village

Table 8(j): Green Sea Turtle Monitoring Protocols – Part A: Monitoring to Detect Nests at Hokulei Shopping Village

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Hokulei Shopping Village

Table 9(j): Green Sea Turtle Monitoring Protocols – Part B: Monitoring of Identified Nests & Minimization for Hokulei Shopping Village

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### Table 8(k): Green Sea Turtle Monitoring Protocols – Part A: Monitoring to Detect Nests at The Shops at Kukui’ula

Please provide search protocols for detecting nests of the **green sea turtle** (Attach pages as needed)

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Waipouli Town Center

Table 8(l): Green Sea Turtle Monitoring Protocols – Part A: Monitoring to Detect Nests at Waipouli Town Center at Waipouli Town Center

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<th>Protocol (fill in protocol &amp; provide reasons)</th>
<th>KSHCP Guideline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location &amp; description of the beach, or beaches, surveyed and the linear distance of the beach</td>
<td>Not applicable</td>
<td>Beach area surveyed should coincide with visibility from the facility with the lights</td>
</tr>
<tr>
<td>Frequency of searches (# per day or per week)</td>
<td>Not applicable</td>
<td>Weekly during nesting season (typ. May 15 to end of August)</td>
</tr>
<tr>
<td>Number of searchers per search area</td>
<td>Not applicable</td>
<td>Depends on site conditions and safety considerations</td>
</tr>
<tr>
<td>Proposed training</td>
<td>Not applicable</td>
<td>Searchers should receive annual training conducted by the DLNR or the USFWS, or their designee (See item 9a)</td>
</tr>
</tbody>
</table>
## Waipouli Town Center

**Table 9(l): Green Sea Turtle Monitoring Protocols – Part B: Monitoring of Identified Nests & Minimization at Waipouli Town Center**

Please provide search protocols to monitor identified nests (from Part A) of the green sea turtle

<table>
<thead>
<tr>
<th>Item</th>
<th>Protocol (fill in protocol &amp; provide reasons)</th>
<th>KSHCP Guideline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency of checks (# per day or per week)</td>
<td>Not applicable</td>
<td>Active nests should be monitored every 1-2 days; then daily during expected hatching date</td>
</tr>
<tr>
<td>Light avoidance</td>
<td>Not applicable</td>
<td>If lights cannot be deactivated or shielded from the nest, each nest should be screened from visible light</td>
</tr>
<tr>
<td>Number of searchers per search area</td>
<td>Not applicable</td>
<td>Depends on site conditions and safety considerations</td>
</tr>
<tr>
<td>Proposed training</td>
<td>Not applicable</td>
<td>Searchers should receive annual training conducted by the DLNR or the USFWS, or their designee (See item 9a)</td>
</tr>
</tbody>
</table>
## Kukui’ula Development (Plantation Core/The Club)

Table 8(m): Green Sea Turtle Monitoring Protocols – Part A: Monitoring to Detect Nests at Kukui’ula Development (Plantation Core/The Club)

Please provide search protocols for detecting nests of the **green sea turtle** (Attach pages as needed)

<table>
<thead>
<tr>
<th>Item</th>
<th>Protocol (fill in protocol &amp; provide reasons)</th>
<th>KSHCP Guideline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location &amp; description of the beach, or beaches, surveyed and the linear distance of the beach</td>
<td>Not applicable</td>
<td>Beach area surveyed should coincide with visibility from the facility with the lights</td>
</tr>
<tr>
<td>Frequency of searches (# per day or per week)</td>
<td>Not applicable</td>
<td>Weekly during nesting season (typ. May 15 to end of August)</td>
</tr>
<tr>
<td>Number of searchers per search area</td>
<td>Not applicable</td>
<td>Depends on site conditions and safety considerations</td>
</tr>
<tr>
<td>Proposed training</td>
<td>Not applicable</td>
<td>Searchers should receive annual training conducted by the DLNR or the USFWS, or their designee (See item 9a)</td>
</tr>
</tbody>
</table>
Please provide search protocols to monitor identified nests (from Part A) of the green sea turtle (Attach pages as needed)

<table>
<thead>
<tr>
<th>Item</th>
<th>Protocol (fill in protocol &amp; provide reasons)</th>
<th>KSHCP Guideline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency of checks (# per day or per week)</td>
<td>Not applicable</td>
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</tr>
<tr>
<td>Light avoidance</td>
<td>Not applicable</td>
<td>If lights cannot be deactivated or shielded from the nest, each nest should be screened from visible light</td>
</tr>
<tr>
<td>Number of searchers per search area</td>
<td>Not applicable</td>
<td>Depends on site conditions and safety considerations</td>
</tr>
<tr>
<td>Proposed training</td>
<td>Not applicable</td>
<td>Searchers should receive annual training conducted by the DLNR or the USFWS, or their designee (See item 9a)</td>
</tr>
</tbody>
</table>
Item 11. Describe the schedule that will be followed to provide training for staff. Training must be provided to those that will conduct and oversee the searches at the facility.

The training should include:

1. Summary of regulations protecting the Covered Species;
2. Search procedures, route, frequency and timing specific to the facility’s monitoring plan, for seabirds and green sea turtle nests (if applicable);
3. Response procedures including safe and proper techniques for handling seabirds;
4. Recognizing evidence of green sea turtle nests, proper nest light screening, and hatchling activity (if green sea turtle minimization and monitoring plan is applicable);
5. Procedures to document the results of searches;
6. Downed wildlife agency contacts; and
7. Nearest SOS aid station.

1. Please refer to Appendix C for detailed Standard Operating Procedures.
Port Allen Solar Farm
Seabird Awareness and Response Training will be provided to all McBryde Resources staff on an annual basis. A copy of the PowerPoint training module is attached as Appendix B2. See also Standard Operating Procedures (SOP) (Appendix C).

Port Allen Center I and II
Seabird Awareness and Response Training will be provided to the Alexander & Baldwin Property Managers and staff that will be conducting the daily seabird searches during the fallout season. A copy of the PowerPoint training module is attached as Appendix B1. See also Standard Operating Procedures (SOP) (Appendix C).

Port Allen South Parcels
Seabird Awareness and Response Training will be provided to the Alexander & Baldwin Property Managers and staff that will be conducting the daily seabird searches on the BEI parcel during the fallout season. A copy of the PowerPoint training module is attached as Appendix B1. See also Standard Operating Procedures (SOP) (Appendix C).

Port Allen Parking Lots
Seabird Awareness and Response Training will be provided to the Alexander & Baldwin Property Managers and staff that will be conducting the daily seabird searches during the fallout season. A copy of the PowerPoint training module is attached as Appendix B1. See also Standard Operating Procedures (SOP) (Appendix C).

Port Allen Steel Warehouse
Seabird Awareness and Response Training will be provided to the Alexander & Baldwin Property Managers and staff that will be conducting the daily seabird searches during the fallout season. A copy of the PowerPoint training module is attached as Appendix B1. See also Standard Operating Procedures (SOP) (Appendix C).

Port Allen Marina Center
Seabird Awareness and Response Training will be provided to the Alexander & Baldwin Property Managers and staff that will be conducting the daily seabird searches during the fallout season. A copy of the PowerPoint training module is attached as Appendix B1. See also Standard Operating Procedures (SOP) (Appendix C).

Pump 3 Hanapepe Valley
Seabird Awareness and Response Training will be provided to the McBryde Resources staff. A copy of the PowerPoint training module is attached as Appendix B2. See also Standard Operating Procedures (SOP) (Appendix C).
Kalaheo Powerhouse
Seabird Awareness and Response Training will be provided to the McBryde Resources staff. A copy of the PowerPoint training module is attached as Appendix B2. See also Standard Operating Procedures (SOP) (Appendix C).

Wainiha Powerhouse
Seabird Awareness and Response Training will be provided to the McBryde Resources staff. A copy of the PowerPoint training module is attached as Appendix B2. See also Standard Operating Procedures (SOP) (Appendix C).

Hokulei Shopping Village
Seabird Awareness and Response Training will be provided to the Alexander & Baldwin Property Managers, individual shopping center managers and the staff that will be conducting the daily seabird searches during the fallout season. A copy of the PowerPoint training module is attached as Appendix B1. See also Standard Operating Procedures (SOP) (Appendix C).

The Shops at Kukui’ula
Seabird Awareness and Response Training will be provided to the Alexander & Baldwin Property Managers, individual shopping center managers and the staff that will be conducting the daily seabird searches during the fallout season. A copy of the PowerPoint training module is attached as Appendix B1. See also Standard Operating Procedures (SOP) (Appendix C).

Waipouli Town Center
Seabird Awareness and Response Training will be provided to the Alexander & Baldwin Property Managers, individual shopping center managers and the staff that will be conducting the daily seabird searches during the fallout season. A copy of the PowerPoint training module is attached as Appendix B1. See also Standard Operating Procedures (SOP) (Appendix C).

Kukui’ula Development (Plantation Core/The Club)
Seabird Awareness and Response Training will be provided to Kukui’ula staff that will be conducting the daily seabird searches during the fallout season. A copy of the PowerPoint training module is attached as Appendix B1. See also Standard Operating Procedures (SOP) (Appendix C).
Item 12. Describe any outreach conducted (e.g., handing out pamphlets on seabird awareness to facility employees or guests, etc):

**Port Allen Solar Farm**
The Port Allen Solar Farm will do outreach to staff during the permit term. During the seabird fledging season they will:
- Distribute seabird awareness pamphlets to McBryde Resources employees and to contractors working outdoors at night at McBryde facilities.
- Post seabird awareness materials in a conspicuous location at the facility.

**Port Allen Center I and II**
The Port Allen Center I and II will do outreach to staff during the permit term. During the seabird fledging season they will:
- Distribute seabird awareness pamphlets to A&B employees and to contractors working outdoors at night at the Port Allen facilities.
- Distribute seabird awareness pamphlets to all tenants of the facility.
- Encourage tenants to post seabird awareness materials in a conspicuous location at their facilities.

**Port Allen South Parcels**
The Port Allen South Parcels will do outreach to staff during the permit term. During the seabird fledging season they will:
- Distribute seabird awareness pamphlets to A&B employees and to contractors working outdoors at night at the Port Allen facilities.
- Distribute seabird awareness pamphlets to all tenants of the facility.
- Encourage tenants to post seabird awareness materials in a conspicuous location at their facilities.

**Port Allen Parking Lots**
Outreach for the Port Allen Parking Lots will consist of posting a seabird informational flyer in the parking lots during the fledging season.

**Port Allen Steel Warehouse**
The Port Allen Steel Warehouse will do outreach to staff during the permit term. During the seabird fledging season they will:
- Distribute seabird awareness pamphlets to A&B employees and to contractors working outdoors at night at the Port Allen facilities.
- Distribute seabird awareness pamphlets to all tenants of the facility.
- Encourage tenants to post seabird awareness materials in a conspicuous location at their facilities.
Port Allen Marina Center
The Port Allen Marina Center will do outreach to staff during the permit term. During the seabird fledging season they will:
- Distribute seabird awareness pamphlets to A&B employees and to contractors working outdoors at night at the Port Allen facilities.
- Distribute seabird awareness pamphlets to all tenants of the facility.
- Encourage tenants to post seabird awareness materials in a conspicuous location at their facilities.

Pump 3 Hanapepe Valley
The Pump 3 Hanapepe Valley will do outreach to existing staff during the permit term. During the seabird fledging season they will:
- Distribute seabird awareness pamphlets to McBryde Resources employees and to contractors who will be working outdoors at night at McBryde facilities.
- Post seabird awareness materials in a conspicuous location at the facility.

Kalaheo Powerhouse
The Kalaheo Powerhouse will do outreach to staff during the permit term. During the seabird fledging season they will:
- Distribute seabird awareness pamphlets to McBryde Resources employees and to contractors who will be working outdoors at night at McBryde facilities.
- Post seabird awareness materials in a conspicuous location at the facility.

Wainiha Powerhouse
The Wainiha Powerhouse will do outreach to staff during the permit term. During the seabird fledging season they will:
- Distribute seabird awareness pamphlets to McBryde Resources employees and to contractors who will be working outdoors at night at McBryde facilities.
- Post seabird awareness materials in a conspicuous location at the facility.

Hokulei Shopping Village
The Hokulei Shopping Village will do outreach to staff during the permit term. During the seabird fledging season they will:
- Distribute seabird awareness pamphlets to A&B employees and to contractors working outdoors at night at the shopping center.
- Distribute seabird awareness pamphlets to all tenants of the facility.
- Encourage tenants to post seabird awareness materials in a conspicuous location at their facilities.
The Shops at Kukui'ula
The Shops at Kukui'ula will do outreach to staff during the permit term. During the seabird fledging season they will:
- Distribute seabird awareness pamphlets to A&B employees and to contractors working outdoors at night at the shopping center.
- Distribute seabird awareness pamphlets to all tenants of the facility.
- Encourage tenants to post seabird awareness materials in a conspicuous location at their facilities.

Waipouli Town Center
The Waipouli Town Center will do outreach to staff during the permit term. During the seabird fledging season they will:
- Distribute seabird awareness pamphlets to A&B employees and to contractors working at the shopping center.
- Distribute seabird awareness pamphlets to all tenants of the facility.
- Encourage tenants to post seabird awareness materials in a conspicuous location at their facilities.

Kukui'ula Development (Plantation Core/The Club)
Kukui'ula Development will do outreach to staff during the permit term. During the seabird fledging season they will:
- Distribute seabird awareness pamphlets to Kukui'ula employees, each of the facilities within the Plantation Core and to contractors working outdoors at night at the facilities.
- Make outreach materials available to guests at various locations around the facilities.
- Post seabird awareness materials in conspicuous locations at the facilities.

PART 2: Take Estimate1, Requested Amount of Take Authorization, and Funding

Item 1. Show the calculation of estimated take for each of the Covered Species.

Following the take estimation methods in the KSHCP for estimating a Participant’s take (Section 6.2.2), the tables below show the take estimate calculation for the facility(s) for each of the Covered Seabirds.

The KSHCP take estimate method utilizes the average of the most recent 5 years of SOS recovery data for the facility. Applied to the data is an adjustment for downed birds not found, based on a 50% discovery rate and an adjustment based on SOS mortality (birds dead on arrival or those that die in care) – average SOS mortality is 12%.
If the landowner-applicant submits a take estimate with an alternate discovery rate, they must provide the reasons why an alternate rate was used to estimate take, including relevant information supporting their reasoning (% of searchable area, search protocols that will be used, any searcher efficiency trials that have been or will be conducted at facilities and/or demonstration of quick, effective recovery of birds). Please include narrative and/or photos and maps to support this.

Table 10: Annual Take Calculation

<table>
<thead>
<tr>
<th></th>
<th>Newell’s Shearwater</th>
<th>Hawaiian Petrel</th>
<th>Band-rumped Storm Petrel</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Annual average number (SOS data – or – monitoring data) of downed NESH (5 most recent years), HAPE or BRSP (15 most recent years)</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2. Annual observed lethal take estimate (12% of 1, all downed birds)</td>
<td>.36</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3. Annual unobserved lethal take estimate (e.g. 100% of 1, all downed birds if 50% searcher efficiency assumed)</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4. Total estimated annual lethal take from light attraction (2+3)</td>
<td>3.36</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Requested Annual Lethal Take</td>
<td>3.46</td>
<td>.1</td>
<td>.033</td>
</tr>
<tr>
<td>Requested Take Over Permit Term</td>
<td>104</td>
<td>3</td>
<td>1</td>
</tr>
</tbody>
</table>

Preliminary take limits for the license/permit term are provided below. Estimates provided are combined estimates for all A&B facilities listed in this application.
Item 2. Select the requested take authorization and permit/license term coverage for each of the Covered Species.

*Table 11: Newell’s Shearwater:*

<table>
<thead>
<tr>
<th>Age Class</th>
<th>Annual Take Estimate: Fledglings</th>
<th>Annual Take Estimate: Adults or Sub-Adults</th>
<th>Take Limit for License/Permit Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortality (Lethal)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Injury (Non-lethal)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Table 12: Hawaiian Petrel:*

<table>
<thead>
<tr>
<th>Age Class</th>
<th>Annual Take Estimate: Fledglings</th>
<th>Annual Take Estimate: Adults or Sub-Adults</th>
<th>Take Limit for License/Permit Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortality (Lethal)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Injury (Non-lethal)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Table 13: Band-Rumped Storm Petrel:*

<table>
<thead>
<tr>
<th>Age Class</th>
<th>Annual Take Estimate: Fledglings</th>
<th>Annual Take Estimate: Adults or Sub-Adults</th>
<th>Take Limit for License/Permit Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortality (Lethal)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Injury (Non-lethal)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Item 3. Funding Assurance. Provide proof of adequate funding (see KSHCP document). All participants must demonstrate requisite funding prior to permit/license approval to ensure that the proposed measures and actions, including monitoring, will be undertaken in accordance with the terms and schedule of the KSHCP.

Alexander & Baldwin, Inc. and its subsidiaries/related entities currently undertake all minimization and conduct all monitoring using existing staff, or outside contractors, as part of annual operating budget, and will continue to do so through the term of the KSHCP. Alexander & Baldwin, Inc. will provide financial assurances as required by the KSHCP.

Signature of Participant: ____________________________

Date: ____________________________

Printed Name: ____________________________

The undersigned affirms that all the information included is true and accurate to the best of the participant’s knowledge and that this PIP is voluntarily submitted.

☐ check to waive confidentiality
Appendices

Appendix A – TMK Maps and Site Plans
Appendix B1 – Seabird Awareness and Response Training Program (Commercial Properties)
Appendix B2 – Seabird Awareness and Response Training Program (McBryde Facilities)
Appendix C – Standard Operating Procedures
Appendix D – A&B Downed Seabird Recovery Report Form
Appendix A
<table>
<thead>
<tr>
<th>Name:</th>
<th>Land Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site:</td>
<td>Building Value</td>
</tr>
<tr>
<td>Sale:</td>
<td>Misc Value</td>
</tr>
<tr>
<td>Mat:</td>
<td>Just Value</td>
</tr>
<tr>
<td></td>
<td>Assessed Value</td>
</tr>
<tr>
<td></td>
<td>Exempt Value</td>
</tr>
<tr>
<td></td>
<td>Taxable Value</td>
</tr>
</tbody>
</table>

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Date printed: 05/16/19: 05:43:14
Site Plan - Port Allen Solar Farm

TMK Nos. (4) 2-1-001:051
Port Allen Commercial Properties – Overview
(Note: Letters on map do not coincide with PIP letter designations for the corresponding properties.)
A - Port Allen Marina Center (TMK No. (4) 2-1-003:040)
B - Port Allen Center I (TMK No. (4) 2-1-003:004)
C - Port Allen Center II (TMK No. (4) 2-1-003:004)
D - Steel Warehouse (TMK No. (4) 2-1-003:028)
E - Small Parking Lot (TMK No. (4) 2-1-003:025)
F - Large Parking Lot (TMK No. (4) 2-1-003:026)
Port Allen Center I and II

| Parcel: 210030040000 | Acres: | Name: | Land Value | Site: | Building Value | Sale: | Misc Value | Mail: | Just Value | Assessed Value | Exempt Value | Taxable Value |

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Date printed: 05/16/19 : 05:27:31
Port Allen Center I and II – Site Plan

TMK No. (4) 2-1-003:004
WAIALO ROAD

(b) Port Allen Center I - Site Plan

PORT ALLEN CENTER

Unit 5
7,000 sf

Unit 4
3,500 sf

Unit 7
3,500 sf

Unit 3
3,500 sf

Unit 2
7,000 sf

Unit 6
3,500 sf

Dock
Ramp

Tax Map Key: (4) 2-1-003-004
Port Allen Center II

Units 1/2
3,000 sf

Unit 3
1,500 sf

Unit 4
1,398 sf

Unit 5
1,400 sf

Unit 6
1,400 sf

Unit 7
1,500 sf

Units 8/9
3,000 sf

PORT ALLEN CENTER 2

KSHCP-PIP Alexander & Baldwin

9-29-2014

Tax Map Key: (4) 2-1-003-004

DRAFT
<table>
<thead>
<tr>
<th>Parcel: 210030000000</th>
<th>Acres:</th>
<th>Name:</th>
<th>Land Value</th>
<th>Site:</th>
<th>Building Value</th>
<th>Sale:</th>
<th>Misc Value</th>
<th>Mail:</th>
<th>Just Value</th>
<th>Assessed Value</th>
<th>Exempt Value</th>
<th>Taxable Value</th>
</tr>
</thead>
</table>

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Date printed: 05/16/19: 05:35:19
Port Allen South Parcels – Site Plan

BEI Fertilizer Facility (TMK No. (4) 2-1-003:029)
Shoreline Parcel (TMK No. (4) 2-1-003:030)
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Date printed: 05/16/19 : 05:29:54
<table>
<thead>
<tr>
<th>Parcel</th>
<th>Name: Port Allen large parking lot</th>
<th>Land Value</th>
<th>Building Value</th>
<th>Misc Value</th>
<th>Just Value</th>
<th>Assessed Value</th>
<th>Exempt Value</th>
<th>Taxable Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>210030260000</td>
<td>Acres:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Date printed: 05/16/19 : 05:30:44

KSHCP-PIP Alexander & Baldwin

A12
Port Allen Parking Lots – Site Plan

TMK Nos. (4) 2-1-003:025 (small lot) and (4) 2-1-003:026 (large lot)

Note three orange asterisks along Waialo Road and one at intersection of Olali Street and Aka Ula Road denote locations of off-site street lamps.
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Date printed: 05/16/19 : 05:32:36
Port Allen Steel Warehouse – Site Plan

TMK No. (4) 2-1-003:028

Note two orange asterisks along Waialo Road denote locations of off-site street lamps.
Lease Expirations

- Unit 8: 5,500 sf
- Unit 8A: 5,000 sf
- Unit 5: 2,825 sf
- Unit 7: 1,785 sf
- Unit 3: 1,862 sf
- Unit 2: 3,050 sf
- Unit 1: 2,600 sf
- 8 Yard: 20,000 sf
- 6 Yard: 13,771 sf

Port Allen Steel Warehouse

To Highway 11

9-2-2016

Tax Map Key: (4) 2-1-003-028
The Kauai County Assessor's Office makes every effort to produce the most accurate information possible. No warranties, expressed or implied, are provided for the data herein, its use or interpretation. The assessment information is from the last certified taxroll. All data is subject to change before the next certified taxroll. PLEASE NOTE THAT THE PROPERTY APPRAISER MAPS ARE FOR ASSESSMENT PURPOSES ONLY NEITHER KAUAI COUNTY NOR ITS EMPLOYEES ASSUME RESPONSIBILITY FOR ERRORS OR OMISSIONS ---THIS IS NOT A SURVEY---

Date printed: 05/16/19 : 05:34:02

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KSHCP-PIP Alexander & Baldwin
Port Allen Marina Center – Site Plan

TMK No. (4) 2-1-003:040

Note orange asterisk at corner of Waialo Road and Aka Ula Road denotes location of off-site street lamp.
Pump 3 Hanapepe Valley Location Map

TMK No. (4) 2-1-001:010 (portion)
Pump 3 – Site Plan

TMK No. (4) 2-1-001:010 (portion)
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Date printed: 05/16/19 : 08:12:02
Kalaheo Hydro Powerhouse Site Plan

TMK No. (4) 2-4-016:013 (portion)
Wainiha Hydro Powerhouse Site Plan

TMK No. (4) 5-8-003:003 (portion)
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Date printed: 05/16/19 : 06:54:38
Hokulei Shopping Village

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Date printed: 05/16/19 : 06:58:43
Hokulei Shopping Village

TMK Nos. (4) 3-3-003:046, 049, 050, 051, 052, 053 (No aerial of completed shopping center available on Google Earth)

Note: TMK No. (4) 3-3-003:054 (NE corner of shopping center) is owned by American Savings Bank and is not part of the property.
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Date printed: 05/15/19 : 22:59:07

A35

KSHCP-PIP Alexander & Baldwin
The Shops at Kukui’ula Site Plan

TMK No. (4) 2-6-015:010
Waipouli Town Center

Parcel: 430080020000
Acres: 

Name: 

Site: 

Sale: 

Mail: 

Land Value
Building Value
Misc Value
Just Value
Assessed Value
Exempt Value
Taxable Value

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Date printed: 05/16/19 : 05:45:56

KSHCP-PIP Alexander & Baldwin
Waipouli Town Center (Kapaa) Site Plan

TMK No. (4) 4-3-008:002
Kukui'ula The Club

Parcel: 260190310000  Acres:

Name:  Land Value
Site:  Building Value
Sale:  Misc Value
Mail:  Just Value

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Date printed: 05/28/19

KSHCP-PIP Alexander & Baldwin
Kukui‘ula Development – The Club/Plantation Core Site Plan

TMK No. (4) 2-6-019:031
Appendix B 1
A & B Commercial Properties
2019 Seabird Awareness and Response Training

Purpose of Training

- Native seabird species including endangered species may “fallout” on any of commercial properties on Kauaʻi on a seasonal basis
- Alexander & Baldwin is committed to the protection of these species
- Alexander & Baldwin has specific endangered bird protocols in place that all personnel must follow
- There are potentially significant legal implications if any of these protocols are not followed
Why do Protected Seabirds Land in our Commercial Properties?

- Seabirds that fly at night are often attracted to lights
- Fledgling birds (keiki's) on their way to sea for the first time are often attracted to lights and can be confused by them
- Confused birds may collide with structures, or simply land on the ground, too tired to continue flying
- Once on the ground, they cannot take off again and will die from starvation or be killed by predators if not rescued
- The vast majority of seabird fallout on Kaua`i occurs between September 15 and December 15 each year
- During fledging season, extra vigilance for downed seabirds is necessary, and additional measures to minimize light attraction may be implemented

Regulatory Setting - Protected Species

Federal -
The Endangered Species Act of 1973 (ESA)
Migratory Bird Treaty Act (MBTA)

State of Hawai`i -
Hawaii Revised Statutes Chapter 195D

IT IS ILLEGAL TO:
“harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct” any species listed under any of these statutes
Agency and Endangered Species Program Contacts

Who to Call

State Department Land & Natural Resources DOFAW
Thomas Kaiakapu: Wildlife Manager: (808) 274-3440

Alexander & Baldwin Program Coordinators

Port Allen Properties:
Trinette Kaui: Office (808) 335-2850 - Cell (808) 335-9708

Hokulei Shopping Village - Shops at Kukuiula - Waipouli Town Center
Stacie Chiba-Miquel: (808) 742-9002 – Cell (808) 320-7790

The Club - Kukui‘ula
Lindsay Crawford (808)742-3046 – Cell (808)652-9379

Reggie David: Cell: (808) 937-0124, email: david003@hawaii.rr.com

Endangered Seabird Species Present on Kaua‘i

Newell’s Shearwater

Hawaiian Petrel

Band-rumped Storm-Petrel
Seabird Issues cont.

- Once on the ground, seabirds cannot take off again and will die from starvation or be killed by predators if not rescued
- If the seabirds are recovered and turned into the Save Our Shearwaters Program (SOS), almost 90% of them can be returned to the wild
- To protect the seabirds, A&B’s commercial properties
  - minimize or shield lights to protect the seabirds
  - search properties to locate downed seabirds

Downed Seabird Response Protocols

- If a downed seabird is found, immediately call your supervisor and as soon as possible the appropriate A & B contact for your property
- First responders will immediately respond to the scene with protective gloves, a clean towel, pet carrier and a digital camera
- Before touching the downed seabird take at least one photo of the scene showing the bird in situ
  - Put on protective gloves
  - Carefully wrap the bird in a clean towel, place in pet carrier
  - Transport the bird to the closest Shearwater Aid Station
**Downed Seabird Response cont.**

- Summon assistance, and once there are two people on hand remove the bird from the pet carrier and take at least two identification photographs of the animal.
- Place the bird in the Shearwater Aid Station.
- Fill in the Shearwater Aid Station white board log and prepare and submit a security report, submit to security manager and to respective A&B shopping center point of contact.

**Take-Home Message**

- Harming listed seabirds may be construed as "take" under the ESA, and/or HRS 195D.
- The minimization and avoidance of "take" to the maximum extent practicable is required under both federal and State of Hawaii endangered species statutes.
- Penalties include civil fines of up to $25,000 per incident, and criminal fines of up to $50,000, and up to one year federal imprisonment per incident.
- Noncompliance with endangered species rules and protocols may result in fines or criminal prosecution.
Mahalo

Alexander & Baldwin thanks you for your attention to and your assistance with this program

Alexander & Baldwin takes pride in our continued efforts to protect the natural resources on the Island of Kaua‘i

Protection of these native birds is everyone’s responsibility, and is in the common interest of the Island community and future generations.
Appendix B2
McBryde Resources, Inc. Facilities
Seabird Awareness and Response Training - 2019

Purpose of Training

- Native seabird species including endangered species may “fallout” on any of our facilities on Kaua’i on a seasonal basis
- McBryde Resources and Alexander & Baldwin are committed to the protection of these species
- McBryde Resources and Alexander & Baldwin have specific endangered bird protocols in place that all McBryde personnel must follow
- There are potentially significant legal implications if any of these protocols are not followed
Why do Protected Seabirds Land in our Facilities?

- Seabirds that fly at night are often attracted to lights
- Fledgling birds ('keiki’s) on their way to sea for the first time are often attracted to lights and can be confused by them
- Confused birds may collide with structures, or simply land on the ground too tired to continue flying
- Once on the ground, they cannot take off again and will die from starvation or be killed by predators if not rescued
- The vast majority of Seabird fallout on Kaua‘i occurs between September 15 and December 15 each year
- During fledging season, extra vigilance for downed seabirds is necessary, and additional measures to minimize light attraction may be implemented

Regulatory Setting - Protected Species

Federal -
The Endangered Species Act of 1973, as amended (ESA)
Migratory Bird Treaty Act (MBTA)

State of Hawai‘i -
Hawaii Revised Statutes Chapter 195D

IT IS ILLEGAL TO:
“harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct” any species listed under any of these statutes
Agency and Endangered Species Program Contacts

Who to Call

State Department Land & Natural Resources DOFAW
Thomas Kaiakapu: Wildlife Manager: (808) 274-3440

McBryde Resources, Inc. Program Coordinators
Dan Sargent: (808) 335-0247, Cell: (808) 645-6386

A&B Biologist
Reggie David: Cell: (808) 937-0124, email: davidr003@hawaii.rr.com

Endangered Seabird Species Present on Kaua‘i

Newell’s Shearwater
Hawaiian Petrel
Band-rumped Storm-Petrel
Seabird Issues cont.

- Once on the ground they cannot take off again and will die from starvation or be killed by predators if not rescued
- If the seabirds are recovered and turned into the Save Our Shearwaters Program (SOS), almost 90% of them can be returned to the wild
- To protect the seabirds, A&B and McBryde
  - minimize or shield lights to protect the seabirds
  - search properties to locate downed seabirds

Downed Seabird Response Protocols

- If a downed seabird is found, immediately call your supervisor and as soon as possible the appropriate A & B or McBryde contact for your facility
- First responders will immediately respond to the scene with protective gloves, a clean towel, pet carrier and a digital camera
- Before touching the downed seabird take at least one photo of the scene showing the bird in situ
  - Put on protective gloves
  - Carefully wrap the bird in a clean towel, place in pet carrier
  - Transport the bird to the closest Shearwater Aid Station
Downed Seabird Response cont.

- Summon assistance, and once there are two people on hand remove the bird from the pet carrier and take at least two identification photographs of the animal
- Place the bird in the Shearwater Aid Station
- Fill in the Shearwater Aid Station white board log and prepare and submit a security report, submit to security manager and to respective McBryde facility point of contact.

Take-Home Message

- Harming of listed seabirds may be construed as “take” under the ESA, and/or HRS 195D.
- The minimization and avoidance of “take” to the maximum extent practicable is required under both federal and State of Hawaii endangered species statutes
- Penalties include civil fines of up to $25,000 per incident, and criminal fines of up to $50,000, and up to one year federal imprisonment per incident.
- Noncompliance with endangered species rules and protocols may result in fines or criminal prosecution.
Mahalo

McBryde Resources, and Alexander & Baldwin thanks you for your attention to and your assistance with this program

McBryde Resources, and Alexander & Baldwin takes pride in our continued efforts to protect the natural resources on the Island of Kaua‘i

Protection of these native birds is everyone’s responsibility, and is in the common interest of the Island community and future generations
Appendix C
**A&B STANDARD OPERATING PROCEDURES**

**Seabird Conservation Awareness Plan**

**PURPOSE:** To establish a procedure and seabird awareness training ensuring that that A&B, its subsidiaries and related entities (“A&B”) are working partners with federal and State of Hawai‘i wildlife conservation and regulatory agencies in efforts to conserve our native Seabirds.

**PROCEDURE/SCOPE:**

This procedure shall be followed at all A&B properties participating in the Kauai Seabird Habitat Conservation Plan (KSHCP).

From September 15th to December 15th each year, A&B will participate in the search for, and recovery and collection of, downed seabirds (Newell’s Shearwater, Hawaiian Petrel, Band-rumped Storm-Petrel and other non-listed seabird species) on its properties.

**Training and Awareness**

A&B staff at each of the covered properties will participate in an annual Seabird Awareness and Response training.

Property/Facility Managers will educate tenants by sending a letter each year explaining our seabird conservation efforts, the SOS (Save our Shearwaters) Program and the KSHCP, and the role played by A&B, its tenants, contractors, vendors, and guests in protecting seabirds.

A&B will educate its employees about seabird conservation through handouts, individual shopping center quarterly operational meetings and its tenant manuals. Seabird Awareness and Response discussions will also be incorporated into regular pre-shift and operational meetings.

Prior to the start of the seabird fallout season, Property/Facility Managers will conduct a lighting audit at each property with a qualified seabird biologist. The objective of that survey is to identify any lights on A&B’s properties that might attract seabirds to the properties. Property/Facility Managers will make the appropriate adjustments to light fixtures as needed.
DLNR and the SOS Program will place SOS Aid Stations on certain properties on or around September 15\textsuperscript{th} each year, including at all of the fire stations around the island and at selected resort properties. There are no SOS Aid Stations on any of the A&B properties covered by this procedure. The location of the nearest aid station to each property will be identified during the annual Seabird Awareness and Response Training.

Property/Facility Managers will ensure that a Downed Seabird Recovery Report Form is completed for each seabird found on or near their respective properties, and will maintain a log for each property of all birds recovered, with all pertinent data. Each time the log is updated, the Property/Facility Manager shall transmit a copy to the A&B Director of Environmental Affairs, who shall maintain a master log of all A&B Properties for periodic comparison to SOS records.

For each bird delivered to an SOS Aid Station, Property/Facility Managers will also ensure that entries are made on the “White Board” at the aid station with the following information:

- Date:
- Time:
- Location found:
- Condition of bird: (Good) (Injured) (Dead)
- Type: Newell’s Shearwater, Hawaiian Petrel, Band-rumped Storm-Petrel, or other (if known).

**Monitoring**

Individual Property/Facility Managers will be responsible to ensure that searchers, first responder personnel and all other staff will make it part of their duties during the seabird season to be vigilant about looking for downed seabirds during their respective work shifts, and to follow the downed seabird protocols.

Staff will follow the “Recovery Procedure” below whenever a downed seabird is found on or near the property.

**Recovery Procedure:**

Deploy the Seabird Recovery Kit. At least one Seabird Recovery Kit shall be available for use at each covered property and shall be stored in a designated location (shared kits may be utilized for multiple properties located in close proximity to each other, such as at Port Allen). Each Kit shall contain the following items:

- Latex or nitrite gloves
- Three towels
- Hand Sanitizer
- Flashlight
- Clip Board, pen, “Downed Seabird Recovery Report Form”
• Bird Carrier (cardboard box or pet carrier; if a box is used, ensure it has adequate ventilation holes) conspicuously marked “Live Animal”

**Live Bird Handling and Procedures:**

1. Take the Seabird Recovery Kit to the downed seabird.
2. Put on gloves.
3. Using a towel to gently cover the bird, pick up the seabird.
4. Place the seabird inside and cover or close the pet carrier/box.
5. Take at least one photograph of the bird and sufficient photographs of the location where it was found to allow the location to be identified again later. Submit photographs electronically to the Property/Facility Manager or designee with the corresponding Downed Seabird Recovery Report Form.
6. Put the gloves and towel back in the Seabird Recovery Kit.
7. Take the bird and pet carrier to the nearest SOS Aid Station.
8. Take the bird and pet carrier to the nearest SOS Aid Station.
9. Call SOS at 635-5117 or 632-0610.
10. Return the Seabird Recovery Kit to its designated storage location. Replace towel and clean cage with bleach or replace box, if dirty.
11. Complete the Downed Seabird Recovery Report Form. If the bird was found off the property (including on an adjacent public road or sidewalk), ensure this is reflected on the form.
12. Turn in the completed form to the appropriate Property/Facility Manager or designee, who will then make the corresponding log entry.

**Dead Bird Handling and Procedures:**

1. Take the Seabird Recovery Kit to the downed seabird.
2. Put on gloves.
3. Take several photographs of the bird and sufficient photographs of the location where it was found to allow the location to be identified again later. Submit photographs electronically to the Property/Facility Manager or designee with the corresponding Downed Seabird Recovery Report Form.
4. Double bag dead seabirds in two, two-gallon Ziploc plastic bags.
5. Write the date and the name of the property on the outer bag with a permanent marker.
6. Place in a refrigerator.
7. Complete the Downed Seabird Recovery Report Form. If the bird was found off the property (including on an adjacent public road or sidewalk), ensure this is reflected on the form.
8. Turn in the completed form to the appropriate Property/Facility Manager or designee, who will then make the corresponding log entry.
Reporting to Agencies:

In the case of recovered live birds, the responsible Property/Facility Manager or their designee shall call the USFWS and DOFAW within 24 hours of a downed bird being recovered on the property.

If a dead bird is recovered, follow the dead bird handling procedures. The responsible Property/Facility Manager or their designee shall IMMEDIATELY call the DOFAW-Kauai Branch, and follow their instructions. They will most likely pick up the carcass, but in some circumstances may instruct the property owner to dispose of the carcass. If instructed to dispose of the carcass by DOFAW, document this information on the Downed Seabird Recovery Report Form, including the name of the person spoken to at DOFAW.

The responsible Property/Facility Manager shall notify the A&B Director, Environmental Affairs upon discovery of any downed seabird and shall forward by email a copy of the Downed Seabird Recovery Report Form, including any photographs taken. All Property/Facility Managers are encouraged to consult with the A&B Director, Environmental Affairs prior to making reports to regulatory agencies; however, such consultation must not delay reporting beyond the specified deadline.

Review and Update:

This policy shall be periodically reviewed and updated to ensure that it is kept current and accurate.

Contacts:

USFWS To be determined
DLNR-DOFAW 274-3433
Save Our Shearwaters 635-5117 or 632-0610
A&B Environmental Affairs 283-8907

These contacts will be entered/updated once the agencies identify their point people for the KSHCP.
A&B Downed Seabird Recovery Report Form

Please fill in all space and return hard copy to the Property Manager or their designee

Date: ___________________________ Time: ________________

Location: __________________________________________________________________________________________
Be specific as possible, i.e. Next to the planter in front of Safeway

Who first reported the bird: ____________________________________________________________

Who responded: ____________________________________________________________________________

Photo Y/N: __________

Condition of bird; Alive and Well (A), Injured (I), Dead (D): ______________

Disposition: _______________________________________________________________________________
Where did the bird end up: SOS Aid Station, SOS or DOFAW

SOS AID Station: _____________________________________________________________________________
Which SOS AID Station was the bird delivered too.

SOS Log Confirmation: _________________________________________________________________________
Confirmation that The SOS Aid Station "White Board" log was completely filled in:

Species if Known: NESH  HAPE  BRSP  Other

Circle the appropriate species Newell's Shearwater (NESH) Hawaiian Petrel HAPE Band-rumped Storm-Petrel BRSP. Other also includes a bird you can't identify

Notes or other information that you think might be helpful: