Appendix A: Kahuama‘a Management Plan

KAHUAMAʻA SEABIRD PRESERVE

MANAGEMENT PLAN

PART OF THE KAUAʻI SEABIRD HABITAT CONSERVATION PLAN

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1. SUMMARY MANAGEMENT PLAN

The objective of the Kahuamaʻa Seabird Preserve Management Plan is to create and maintain a terrestrial predator proof sanctuary for ʻaʻo. 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 Kauaʻi Seabird Habitat Conservation Plan (KSHCP): to mitigate authorized take impacts on the Covered Seabirds in the HCP (ʻaʻo or Newell's Shearwater –*Puffinus auricularis newelli*, ʻuaʻu or Hawaiian Petrel - *Pterodroma sandwichensis* and Hawaiʻi distinct population segment (DPS) of the ʻakēʻakē or band-rumped storm-petrel - *Oceanodroma castro*, hereafter ʻakēʻakē) 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 Kahuamaʻa Seabird Preserve (also referred to as 'the site') will be carried out by a Prime Contractor, on behalf of the participants in the KSHCP. The site is located in Kōkeʻe 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 ʻaʻo 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 Prime Contractor will include an annual report.

2. INTRODUCTION

Kahuamaʻa Seabird Preserve is a 2 hectare (ha) Social Attraction Site (SAS) for ʻaʻo 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 Kauaʻi, 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 ʻaʻo, a listed seabird, as part of the Kauaʻi 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 ʻuaʻu or Hawaiian petrel (*Pterodroma sandwichensis*) and ʻakēʻakē 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 Kauaʻl'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 Kahuamaʻa 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 Kauaʻi 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 Kauaʻi (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), ʻōpeʻapeʻa 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 Kauaʻi Endangered Seabird Recovery Project (KESRP) indicates that Kahuamaʻa 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 ʻaʻo and ʻuaʻu on Kauaʻi are located within 25km of the mitigation site. In addition, ʻaʻo and ʻuaʻu calls were recorded at the site in 2016 using an acoustic song meter (Raine et al. 2016). Kahuamaʻa 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, Kahuamaʻa 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 ōpeʻapeʻa, 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 Hawaiʻi - Department of Land and Natural Resources (DLNR) Division of State Parks and straddles two parks: Kōkeʻe 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.

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 and a Prime Contractor. NFWF will hold the funds received from the Participants for the term of the HCP and will make payments 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 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 as defined in the KSHCP.

3. VISION STATEMENT

The Kahuamaʻa Seabird Preserve will become a terrestrial predator free sanctuary for a thriving colony of breeding ʻaʻo. ʻUaʻu 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 ʻuaʻu and ʻakēʻakē 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.

Kahuamaʻa 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 Kahuamaʻa Seabird Preserve is located near the terminal end of Highway 550, within Kōkeʻe State Park and Nā Pali Coast State Park, between the Kalalau and Puʻu O Kila visitor lookouts, identified on the map as part of Kahuamaʻa Flat (Figure 4.1)

Figure 4.1: Satellite image of Kahuamaʻa Flats with Kalalau Lookout. Red pin indicates SAS. Google Maps.

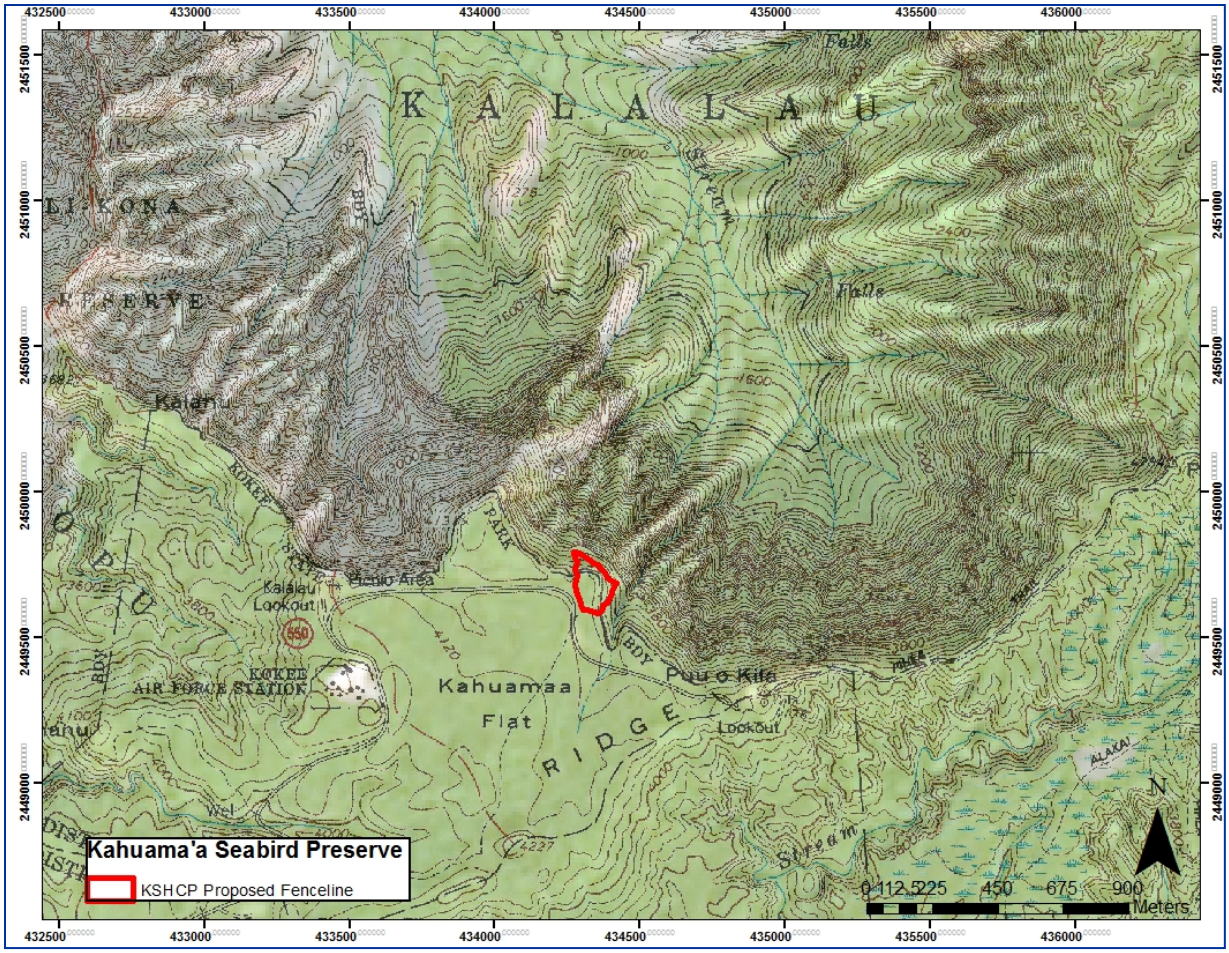


Figure 4.2. Map of SAS location in relation to Kalalau Valley.

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 Prime Contractor of the KSHCP, an Agreement between State Parks and the Participants' Committee 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

Kahuamaʻa Seabird Preserve is located on the northwestern side of Kauaʻi, 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**

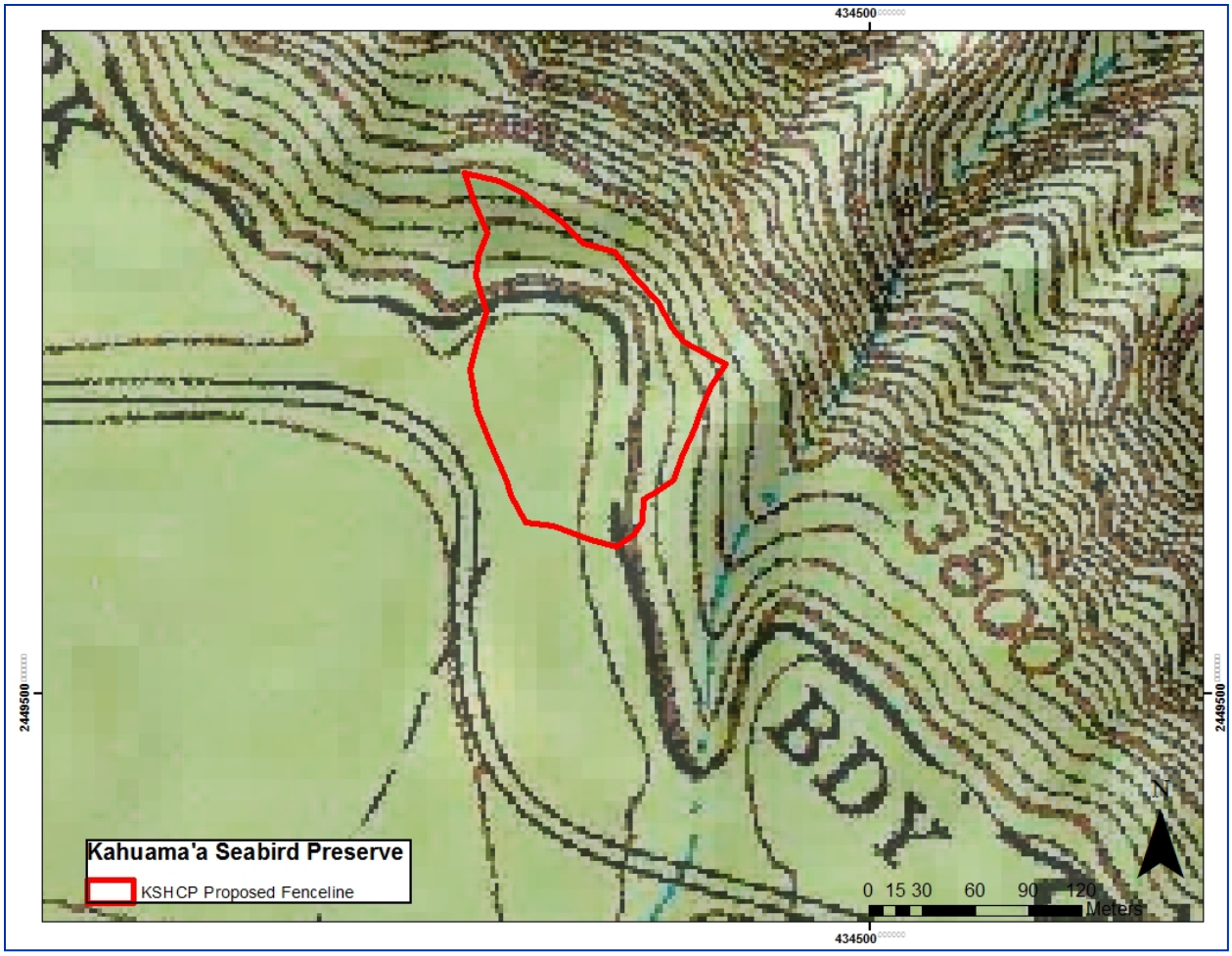


Figure 5.1. Image of site showing topography.

5.2 Climate

The Kahuamaʻa 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 Kōkeʻe 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 ʻIniki (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 and Yent (1994) describe the soils and topography as; "Kōkeʻe 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 Hawaiʻi's natural and cultural history and aesthetic values.

The Kahuamaʻa 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 Kahuamaʻa Seabird Preserve depends in part upon cooperation amongst the stakeholders in the project. These include the KSHCP Participants, the Prime Contractor, the regulatory agencies, conservation groups and landowners. Table 6.1 outlines these groups in more detail and provides a framework for the Prime Contractor to identify the future point of contact.

Table 6.1. Stakeholders in Kahuamaʻa Seabird Preserve

Stakeholder	Role
KSHCP Participants	
Alexander and Baldwin (A&B)	KSHCP Participant
County of Kauaʻi	KSHCP Participant
Hawaiʻi Department of Transportation (HDOT)	KSHCP Participant
Kauaʻi Coffee	KSHCP Participant
Kauaʻi Marriott Resort, Līhuʻe	KSHCP Participant
Norwegian Cruise Line (Bahamas) Ltd. (NCL)	KSHCP Participant
Princeville Resort Kauaʻi	KSHCP Participant
Kauaʻi Blue, Inc. dba. Sheraton Kauaʻi	KSHCP Participant
Project Manager	Prime Contractor Staff
Staff/Technician	Prime Contractor Staff
USFWS	Regulatory / Advisory
State Parks	Land Owner
DOFAW Plant Extinction Prevention Program (PEPP)	Regulatory / Advisory
DOFAW Admin (Oʻahu)	Regulatory / Advisory
DOFAW Kauaʻi Branch	Advisory
KESRP	Advisory
Kōkeʻe Resource Conservation Program (KRCP)	Advisory
SOS (Kauaʻi Humane Society) or other qualified vet / rehab center shearwaters	Resource
NTBG	Advisory
Hunters (archers only)	Land User
Kōkeʻe Discovery Center	Land User

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 Kahuamaʻa Seabird Preserve), State Park archaeologists conducted a reconnaissance survey in the area of the Kahuamaʻa 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 Kōkeʻe and the area is thought to have been a resource-gathering zone rather than a permanent habitation), they made several recommendations to ensure that any possible sites were not adversely affected. These are included in the Best Management Practices - Section 17.1.6 and 17.2.9).

6.3 Visitors

The principal focus of the Kahuamaʻa Seabird Preserve is to provide mitigation for unavoidable incidental take impacts to ʻaʻo. 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 Puʻu O Kila Lookout. Therefore, as part of the Management Plan, the Prime Contractor 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 Kahuamaʻa Seabird Preserve as well as providing some information on the special importance of ʻaʻo to Kauaʻi. 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 Kahuamaʻa 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 ʻŌhiʻa Lowland Mesic Forest, with ʻuluhe 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.*[2]), 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

[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.)

Australian tree fern, Himalayan (kahili) ginger and strawberry guava), as they modify the habitat in which they breed.

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 PEP botanists. Highlighted plants are federally or state endangered, threatened or PEPP.

Family	Taxon Name	Common Name	Status	FedStat
Asteliaceae	*Astelia argyrocoma* A.Heller ex Skottsb.	Pa‘iniu	Endemic	
Cyperaceae	*Carex wahuensis* sp.	‘Uki	Endemic	
Amaranthaceae	*Charpentiera elliptica* (Hillebr.) A.Heller	Pāpala	Endemic	
Asparagaceae	*Chrysodracon aurea* (H.Mann) P.-L. Lu & Morden	Halapepe	Endemic	
Araliaceae	*Cheirodendron fauriei* Hochr.	‘Ōlapa	Endemic	
Araliaceae	*Cheirodendron trigynum* subsp. *helleri* (Sherff) Lowry	‘Ōlapa	Endemic	
Dicksoniaceae	*Cibotium glaucum* (Sm.) Hook. & Arn.	Hāpu‘u	Endemic	
Dicksoniaceae	*Cibotium nealiae* O.Deg.	Hāpu‘u	Endemic	
Pteridaceae	*Coniogramme pilosa* (Brack.) Hieron.	Loulu	Endemic	
Rubiaceae	*Coprosma kauensis* (A.Gray) A.Heller	Kōī	Endemic	
Rubiaceae	*Coprosma waimeae* Wawra	‘Ōlena	Endemic	
Corynocarpaceae	*Corynocarpus laevigatus* J.R.Forst. & G.Forst.	Karaka nut	Naturalized	
Lauraceae	*Cryptocarya mannii* Hillebr.	Hōlio	Endemic	SOC
Thelypteridaceae	*Cyclosorus parasiticus* (L.) Farw.	Parasitic maidenfern	Naturalized	
Liliaceae	*Dianella sandwicensis* Hook. & Arn.	‘Uki‘uki	Indigenous	
Gleicheniaceae	*Dicranopteris linearis*	‘Uluhe	Indigenous	
Athyriaceae	*Diplazium sandwichianum* (C.Presl) Diels	Hō‘i‘o	Endemic	
Gleicheniaceae	*Diplopterygium pinnatum* (Kunze) Nakai	‘Uluhe lau nui	Endemic	
Sapindaceae	*Dodonaea viscosa* Jacq.	‘A‘ali‘i	Indigenous	
Blechnaceae	*Doodia kunthiana* Gaudich.	‘Ōkupukupu, Pāmoho	Endemic	
Asteraceae	*Dubautia kalalauensis*	Na‘ena‘e	Endemic	E, PEP
Dryopteridaceae	*Dryopteris fusco-atra* var. *fusco-atra*	‘I‘i	Endemic	

Elaeocarpaceae	*Elaeocarpus bifidus* Hook. & Arn.	Kalia	Endemic	
Elaphoglossaceae	*Elaphoglossum paleaceum* (Hook. & Grev.) Sledge	Mākuʻe	Indigenous	
Asteraceae	*Erigeron karvinskianus* DC.	Daisy Fleabane	Naturalized	
Euphorbiaceae	*Euphorbia remyi* var. *remyi*	ʻAkoko	Endemic	E
Santalaceae	*Exocarpos luteolus* C.N.Forbes	Heau	Endemic	E
Pandanaceae	*Freycinetia arborea* Gaudich.	ʻIeʻie	Indigenous	
Zingiberaceae	*Hedychium gardnerianum* Sheppard ex Ker Gawl.	Himalayan (kahili) ginger	Naturalized	
Aquifoliaceae	*Ilex anomala* Hook. & Arn.	ʻAiea	Indigenous	
Rubiaceae	*Kadua affinis* DC.	Manono	Endemic	
Rubiaceae	*Kadua foggiana* (Fosberg) W.L.Wagner & Lorence	Manono	Endemic	
Crassulaceae	*Kalanchoe pinnata* (Lam.) Pers.	Air plant	Naturalized	
Epacridaceae	*Leptecophylla tameiameiae* (Cham. & Schltdl.) C.M.Weiller	Pūkiawe	Indigenous	
Campanulaceae	*Lobelia yuccoides* Hillebr.	Pānaunau	Endemic	SOC
Primulaceae	*Lysimachia kalalauensis* Skottsb.	No common name	Endemic	
Rutaceae	*Melicope clusiifolia* (A.Gray) T.G.Hartley & B.C.Stone	Kūkaemoa	Endemic	
Rutaceae	*Melicope feddei* (H.Lév.) T.G.Hartley & B.C.Stone	Alani	Endemic	
Myrtaceae	*Metrosideros polymorpha* var. *dieteri* J.W.Dawson & Stemmerm.	ʻŌhiʻa lehua	Endemic	
Myrtaceae	*Metrosideros polymorpha* var. *glaberrima* (H.Lév.) H.St.John	ʻŌhiʻa lehua	Endemic	
Dennstaedtiaceae	*Microlepia strigosa* var. *strigosa*	Palapalai	Indigenous	
Myricaceae	*Morella faya* (Aiton) Wilbur	Fire tree	Naturalized	
Myrsinaceae	*Myrsine alyxifolia* Hosaka	Kōlea	Endemic	
Myrsinaceae	*Myrsine knudsenii* (Rock) Hosaka	Kōlea	Endemic	E, PEP
Lomariopsidaceae	*Nephrolepis exaltata* (L.) Schott	Kupukupu, sword fern	Indigenous	
Oleaceae	*Nestegis sandwicensis* (A.Gray) O.Deg., I.Deg. & L.A.S.Johnson	Olopua	Endemic	
Solanaceae	*Nothocestrum longifolium* A.Gray	ʻAiea	Endemic	
Passifloraceae	*Passiflora tarminiana* Coppens & Barney	Banana poka	Naturalized	

Celastraceae	*Perrottetia sandwicensis* A.Gray	Olomea	Endemic	
Sapotaceae	*Planchonella sandwicensis* (A.Gray) Pierre	ʻĀlaʻa	Endemic	
Araliaceae	*Polyscias flynnii* (Lowry & K.R.Wood) Lowry & G.M.Plunkett	ʻOheʻohe	Endemic	E, PEP
Araliaceae	*Polyscias waialealae* (Rock) Lowry & G.M.Plunkett	ʻOheʻohe	Endemic	
Arecaceae	*Pritchardia minor* Becc.	Loulu	Endemic	SOC
Myrtaceae	*Psidium cattleianum* Sabine	Strawberry guava	Naturalized	
Dennstaedtiaceae	*Pteridium aquilinum* subsp. *decompositum* (Gaudich.) Lamoureux ex J.A.Thomson	Kīlau pueo	Endemic	
Rubiaceae	*Psychotria greenwelliae* Fosberg	Kōpiko	Endemic	
Rubiaceae	*Psychotria hexandra*	Kōpiko	Endemic	
Rosaceae	*Rubus argutus* Link	Sawtooth blackberry	Naturalized	
Blechnaceae	*Sadleria cyatheoides* Kaulf.	ʻAmaʻu	Endemic	
Blechnaceae	*Sadleria souleyetiana* (Gaudich.) T.Moore	ʻAmaʻu	Endemic	
Goodeniaceae	*Scaevola procera* Hillebr.	Naupaka kuahiwi	Endemic	
Poaceae	*Schizachyrium condensatum* , *Andropogon spp.* (Kunth) Nees	Bush beard grass	Naturalized	
Selaginellaceae	*Selaginella arbuscula* (Kaulf.) Spring	Lepelepe a moa	Endemic	
Cyatheaceae	*Sphaeropteris cooperi* (Hook. ex F.Muell.) R.M.Tryon	Australian tree fern	Naturalized	
Gleicheniaceae	*Sticherus owhyhensis* (Hook.) Ching	ʻUluhe	Endemic	
Myrtaceae	*Syzygium sandwicense* (A.Gray) Müll.Berol.	ʻŌhiʻa hā	Endemic	
Ericaceae	*Vaccinium calycinum* Sm.	ʻŌhelo	Endemic	
Ericaceae	*Vaccinium dentatum* Sm.	ʻŌhelo	Endemic	
Flacourtiaceae	*Xylosma Hawaiiense* Seem.	Maua	Endemic	
Rutaceae	*Zanthoxylum dipetalum* var. *dipetalum*	Kāwaʻu	Endemic	SOC

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 Plant 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 ʻōpeʻapeʻa is known to occur 1km to the southwest of the site at the Hawaiʻi 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 ʻAʻo – Newell's Shearwater

The ʻaʻo, or Newell's Shearwater, is endemic to Hawaiʻi, with Kauaʻi 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 Hawaiʻi Endangered Species laws
- Endangered on the International Union for Conservation of Nature (IUCN) Red List of Threatened Species (Birdlife International 2010).

Figure 7.1. The ʻaʻo. N Banfield.

Birds are nocturnal and ground nesting, breeding in burrows in steep, high elevation terrain. Their preferred habitat is open native forest dominated by ʻōhiʻa lehua (*Metrosideros polymorpha)* with a dense understory of ʻuluhe 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 ʻaʻo exhibits high site and mate fidelity.

The population of ʻaʻo 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 ʻiʻiwi (*Drepanis coccinea*) (federally listed as threatened under the ESA), ʻapanane (*Himatione sanguinea*), Kauaʻi ʻelepaio (*Chasiempis sandwichensis)*, Kauaʻi amakihi (*Hemignathus Kauaiensis*) and ʻanianiau (*Magumma parva*). ʻAnianiau and Kauaʻi ʻamakihi 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.

Species Common Name	Scientific Name	Confir-med Present	State Status	Federal Status	IUCN Status
Plants					
ʻOheʻohe	*Polyscias flynnii*	√	Endangered, PEP	Endangered	Critically Endangered
Kōlea, (Rock) Hosaka	*Myrsine knudsenii*	√	Endangered, PEP	Endangered	Endangered
Heau	*Exocarpos luteolus*	√	Endangered	Endangered	Critically Endangered
ʻAkoko	*Euphorbia remyi var.*	√	Endangered	Endangered	Critically Endangered
N - CONFIDENTIAL	*D – CONFIDENTIAL*	(outside fence)	Endangered, PEP	Endangered	Critically Endangered
Pānaunau	*Lobelia yuccoides*	√	Species of Concern	Not Listed	Not Assessed
Loulu	*Pritchardia minor*	√	Species of Concern	Not Listed	Endangered
Kāwaʻu	*Zanthoxylum dipetalum var. dipetalum*	√	Species of Concern	Not Listed	Near Threatened
Hōlio	*Cryptocarya mannii Hillebr.*	√	Species of Concern	Not Listed	Near Threatened
Birds					
ʻIʻiwi	*Drepanis coccinea*	√	Threatened	Threatened	Vulnerable
Bats					
Hawaiian hoary bat - ʻōpeʻapeʻat	*Lasiurus cinereus semotus*	possible	Endangered	Endangered	Least Concern

8. SEABIRD STUDIES ON SITE – KAHUAMAʻA SEABIRD PRESERVE

8.1 Kauaʻi and the Kahuamaʻa Seabird Preserve – Background to Site Selection and Role in ʻAʻo Conservation

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

The Kauaʻi Endangered Seabird Recovery Project (KESRP) conducted auditory surveys and identified the ridges and slopes along the northwest coast of Kauaʻi as displaying the highest levels of ʻaʻo and ʻuaʻu breeding activity. These areas are known as ʻpolygonsʼ or ʻcalling hotspotsʼ (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.

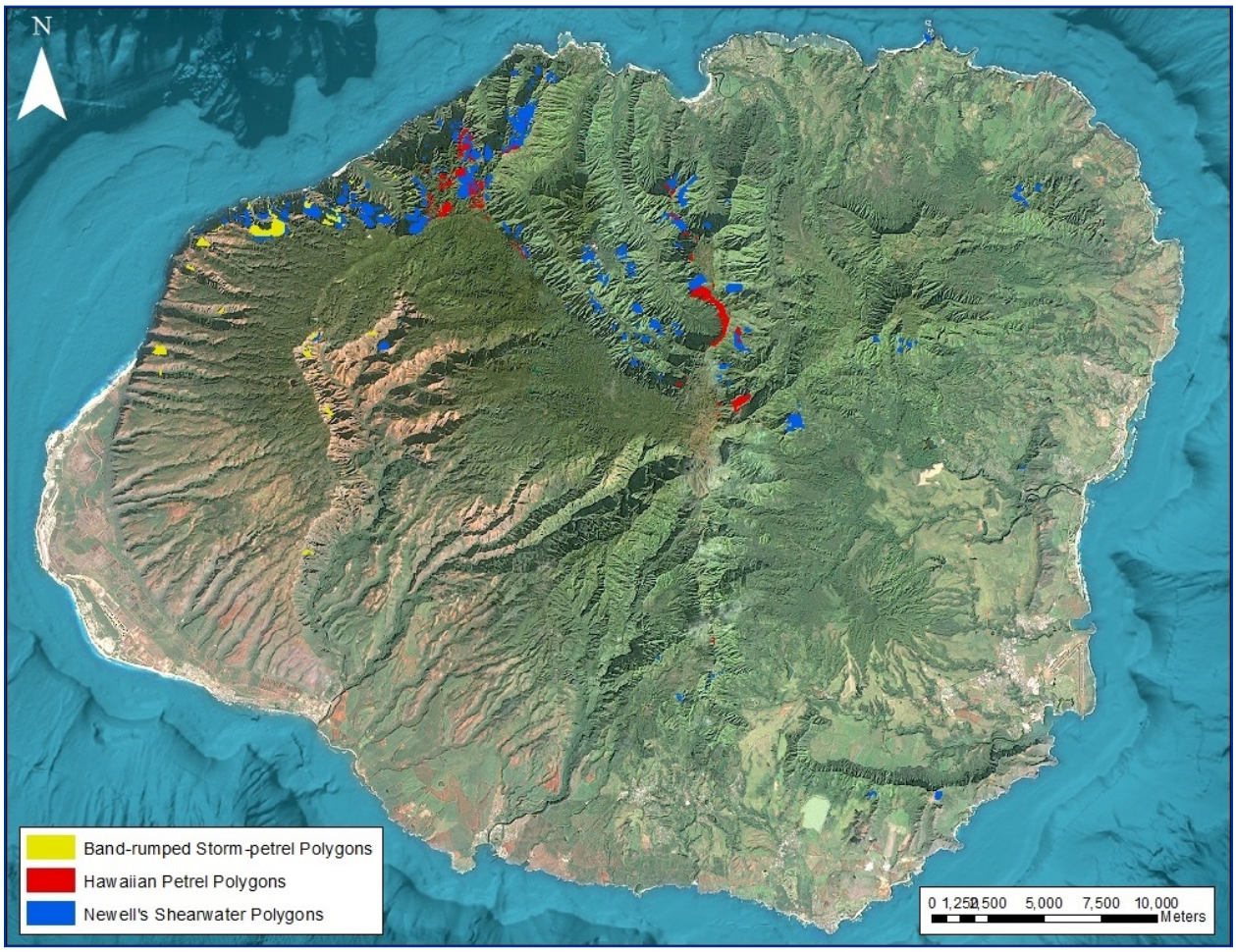


Figure 7.2. Map of ʻCalling Hotspotsʼ on Kauaʻi (KESRP).

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 ʻaʻo and ʻuaʻu activity (AUD 1: UTM 0434363 E, 2449690 N). The device was recovered on July 7th, 2016. Data was analyzed by KESRP and Conservation Metrics. ʻAʻo 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 ʻaʻo 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 Kauaʻi (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 ʻuaʻu calls were recorded by the song meter. No barn owl calls or ʻakēʻakē calls were recorded.

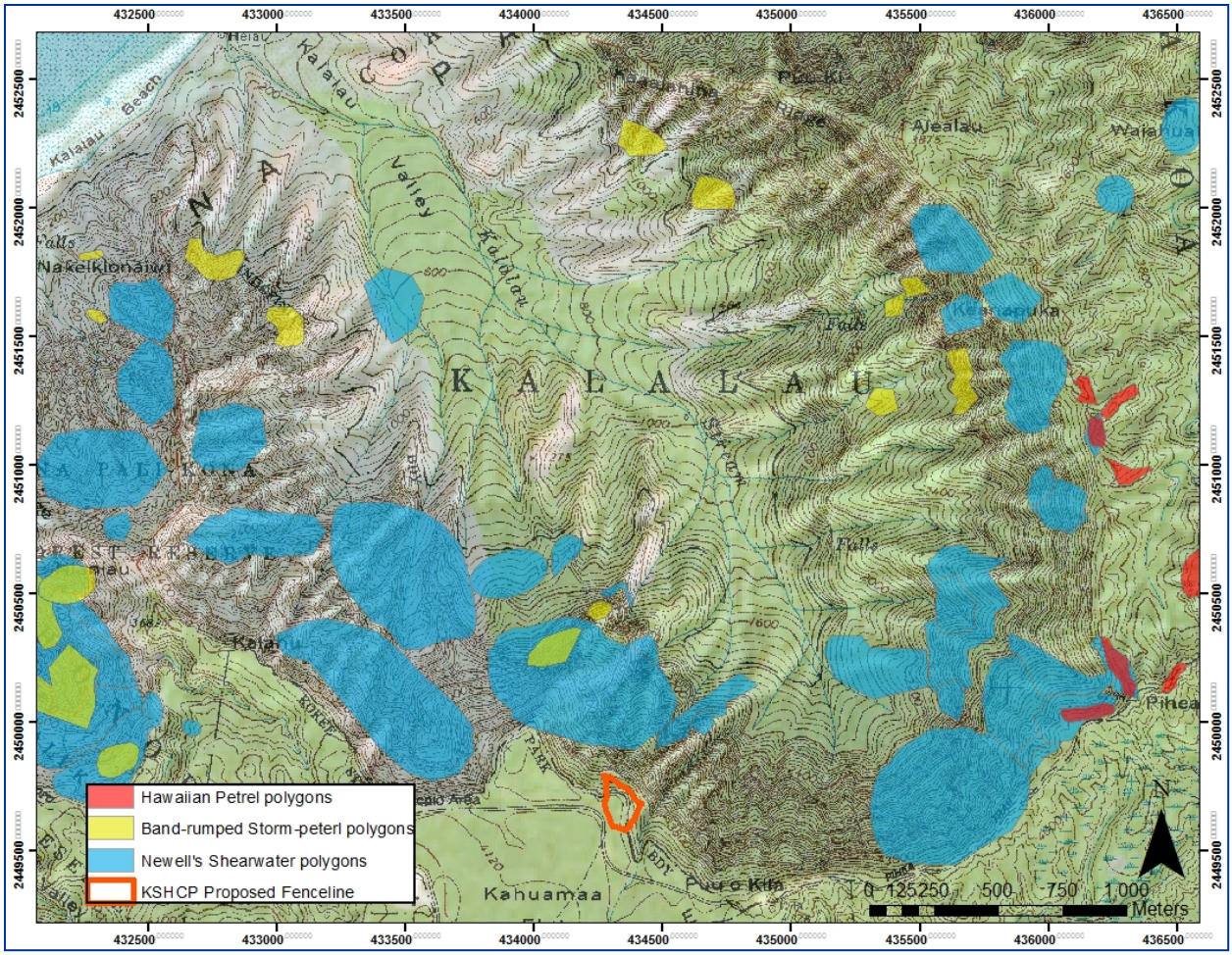


Figure 7.3. Map of location for the Kahuama‘a Seabird Preserve showing ‘hotspot’ polygons for the Covered Seabirds in surrounding area.

As a mitigation project for incidental take of ‘a‘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 Kahuamaʻa 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 ʻaʻo 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 ʻaʻo, 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 transitting 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 ʻaʻo 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 ʻaʻo in densities that could serve as source colonies for the site. The maximum number of ʻaʻo 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 Kahuamaʻa 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 ʻaʻo which will supply new birds to the site.

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

9. OBJECTIVES

The objectives of the Kahuamaʻa Seabird Preserve mirror those of the KSHCP in Table 9.1.

Table 9.1: KSHCP Objectives

Goal 2: Mitigate authorized take of the Covered Species and provide a net gain in recovery for each of the Covered Species.	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 program implementation.
	2.D. Breeding activity by Covered Seabirds documented at the mitigation site by Years 5-7 of KSHCP program implementation.
	2.E. Cumulative upward trend in Covered Seabird breeding documented at the mitigation site by Years 10-12 of KSHCP program implementation.
	2.F. Continued cumulative upward trend in Covered Seabird breeding documented at the mitigation site by Year 20 of KSHCP program 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.

10. ACTIVITIES

10.1 Activities Overview

Achieving the objectives of the Kahuamaʻa 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:

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

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 Prime Contractor 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 Prime Contractor 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).

Figure 10.3. Example of pedestrian gate design that does not extend to ground level (Young and VanderWerf 2014)

Figure 10.4. Similar predator-proof fence at Hutton's shearwater colony, Kaikoura, New Zealand. A Raine.

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 Prime Contractor 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. Prime Contractor 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, Prime Contractor 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, Prime Contractor 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 Kahuamaʻa Seabird Enclosure. If predators are found to be present, Prime Contractor staff will initiate the predator removal procedures outlined in this management plan in section 11.
- If the breach occurred during the breeding season, Prime Contractor 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. Prime Contractor 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 Hawaiʻi, these include the Nihoku Ecosystem Restoration Project at Kīlauea Point National Wildlife Refuge in Kauaʻi in 2015, Makamakaʻole Seabird Preserve in Maui in 2013 and Kaʻena Point Natural Area Reserve on Oʻahu in 2011.

Kahuamaʻa 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 Kaua'i. To remove rodents inside the fence enclosure, trained and certified technicians will set up the following grids using a GPS:

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

These traps house a firing system in a narrow opening, positioned vertically to the ground. When rats take the bait, a bolt fires, killing the predator instantly.

- 25 will be spaced every 50m - 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.
- A further 40 will be mounted every 50m in the 50m predator defense zone outside the fenceline and will remain there for the duration of the project
- Traps will be checked monthly, strike counter noted, CO_2 canister tested and changed if required and trap re-baited if necessary by removing the shroud cap, taking out the longlife lure bottle, tapping out tired lure as a pre-feed to attract pests, wiping and replacing lure. 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. Similar brands may also be used.

11.1.1.2 Enclosed rat "snap" traps (Victor, DOC 200 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) will be set up (numbers may vary 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. However, if rat presence inside the fence continues to be a problem, the "snap" traps will remain. The snap traps will remain outside the fence for the duration of the project.

- Options include the Victor Rat Traps and the DOC200.
- There are a variety of possible baits. The Makamakaʻole project (S Engler, 2017, pers. comm.) have advised that the most effective bait to date is eggs (with a small hole poked in them) for the DOC200's and a homemade formula of peanut powder, coconut oil, wax and preservatives in a mold for snap traps. This wax bait has proven to last up to 2 weeks in the field without molding (whereas peanut butter alone lasts only 3 days). In Kauaʻi, GoodNature bait has proved effective for snap traps (K Pias, 2017, pers. comm.) but other brands can be used.
- Traps will be placed in a bird excluding box designed to exclude non-target species, guide target species, and maintain the integrity of the trap from weather (Mosher et al. 2010). Plans can be found at (http://www.doc.govt.nz/Documents/conservation/threats-and-impacts/animal-pests/doc250-predator-trap.pdf) (Peters 2017). See Figure 11.1. Alternatively, 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

11.1.1.3 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.
- Stations will be 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). Bait will be placed on a rod and box will have lid screws to eliminate risk of removal and caching of bait by rodents. 16 bars are allowed per station according to the label, but 11 is the maximum that will fit in the station on the rod so that bait is not shaken free (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.
- Any bait blocks that are wet or excessively moldy will be removed and replaced with fresh bait. Spoiled bait blocks will be placed in a plastic bag and disposed of in an off-site location and any bait blocks that have been dragged out of the station will be returned to the station (if in reusable state) or removed if unusable
- 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. However, their use will be kept to the minimum possible, if used at all.
- KSHCP personnel or contractor will be certified as applicators of restricted-use rodenticide. These certifications will need to be renewed every 4 years, or as dictated by the HDOA.
- 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, unarmed 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

2.B. 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.

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 10 Reconyx camera traps inside the enclosure for three months or until social attraction commences (these cameras will later be used for burrow monitoring).

11.1.2.1 Potential Feral Cat Eradication Methods (inside the fence)

- Conibears

Conibears (Body Gripper Traps - Duke #220 or similar) for feral cats will be used following fence completion in case cats have not left the site by their own volition.

Conibears have the potential to kill birds and therefore will only be deployed within bird excluding boxes; these can be homemade out of a Tupperware box (K. Pias, pers. comm.) Two traps will be place in a location to be decided by technicians based on camera data and other evidence of cat presence / knowledge of cat behaviour.

Conibears may also be used in the event of an incursion, as outlined in section 11.1.2.

- Live Traps

If there is any evidence of cats inside the fence after construction (scat, camera, visual sightings etc.), the 8 live traps (tomahawks) from outside the fence will temporarily be deployed inside the fence until all cats are captured.

- Goodnature Traps

The current design of Goodnature cat traps has not proved effective in Kaua‘i, however new models are being considered and might be added to the project in the future.

- Shooting

If the above methods are not successful, feral cats can also be dispatched by shooting. This would be done at night, using visual, scent or aural lures, with a rifle with a night scope, operated by a trained technician.

11.1.2.2 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).

All 8 live feral cat traps will be deployed inside the fence. 2 conibears in bird excluding boxes will be set and baited inside the fenced area at an appropriate location as determined by cameras and other evidence, until the feral cat is eradicated. The feral cat may also be humanely dispatched by shooting as outlined above.

11.1.2.3 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 neighbouring source colonies. Therefore, feral cat control along the fenceline will be carried out as follows:

Live feral cat traps

- 8 live feral cat traps (30” and 36” Tomahawks or similar) will be deployed, 2 on each side of the fence. These will be a mixture of baited traps and un-baited trail set traps (double door tomahawks).
- Traps to be run, in the course of technicians’ other duties. When open, they will be checked every 24 hours to adhere to IACUC standards.
- Bait will be a combination of dry cat food and synthetic shellfish oil replaced every 2-3 days or as needed. Baits will be adaptively implemented based on best available information and the findings of related projects.
- 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.).
- Feral cat carcasses will be necropsied and stomach contents will be examined for evidence of seabird predation.
- Non-target pest species (e.g. rats) that are caught in the live traps will also be dispatched.

Cameras

- Two cameras will be used outside the fence to monitor for cat presence (see section 11.1.1 for methods)

Trapped Animal Dispatch

- Technicians will receive firearm training. Trapped feral cats will be dispatched humanely.
- The MOA with State Parks will include an agreement regarding use of firearms on designated State Parks land.

11.1.3 Mongoose

The establishment of Indian mongoose (Herpestes javanicus) is uncertain on the island of Kaua‘i (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 commence the procedures outlined by Phillips and Lucey (2016). Should this occur, the KSHCP activities will be modified if USFWS and DLNR reasonably determine, in consultation with Participants, that such a response is necessary.

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 Honopū 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 Honopū (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 Nu‘alolo ‘Āina 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 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 will 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.
- Live bait will consist of captured, humanely-held rats (*Rattus rattus*) or mice (*Mus musculus)*. Food, shelter, water and insulating cover will be provided to bait rodents in the trap.
- 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.
- Barn owl traps will be set outside of the enclosure to prevent reintroduction of rodents to the facility.
- Mist netting, pole traps and any other relevant technologies that become available over the timespan of the project will also be employed.
- Trapping will continue for the 30-year duration of the project.

11.2.2 Barn Owl Reduction Methods - Shooting

- Shooting 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. Fire-arm technician will choose a location based on auditory data and visual sightings. These points can be altered as more information is gained about individual territories, roosts, etc. to cover the Kalalau Valley.
- Timing will be at and just after sunset, and at or just prior to sunrise. This will be subject to change based upon observed activity patterns of owls, 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 ʻakēʻakē 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.
- An attempt will be made to retrieve the remains for autopsy to assess stomach contents but this is frequently not possible (G. Reid, 2016, pers. comm.).
- 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 Kahuamaʻa 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 Honopū, expected source populations for the Kahuamaʻa 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 ʻaʻo was recorded at a parking area near the Honopū colony, which is close to the Kahuamaʻa Seabird Preserve (A. Raine, 2017, pers. comm.). Data from cameras and predation records at various colonies in Kauaʻi 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 Kahuamaʻa 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 Puʻu 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 Kahuamaʻa 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 Kahuamaʻa Seabird Preserve.

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

11.1.1 Feral Cat Removal Methods

Feral cats will be targeted as follows:

Live feral cat traps

- 30 live 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). 20 will be spaced approximately every 100m along at least 2km of trap lines from Kalalau Lookout to Puʻu O Kila Lookout and along likely cat trails into neighboring colonies. Using camera data as a guide, a further 10 live cat traps will be used in a roving capacity for maximum efficacy.
- Each trap will be placed on level ground, and camouflaged using proximal vegetation. Visual lures and stepping sticks will be installed in all traps to pique feline curiosity and increase trap effectiveness. They will be checked once every 24 hours to meet humane standards and ensure that no seabirds are harmed.

- Traps will be baited using food derived lures such as sardines, cat biscuits and synthetic shellfish oil, replaced every 2-3 days or as needed. Baits will be adaptively implemented based on best available information and the findings of related projects.
- 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:

- 24 conibear traps (with appropriate seabird excluding box) will be deployed, with 14 placed 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. This type of trap can be set and left active for longer periods of time, allowing active trapping to take place regardless of staff presence within the preserve. 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 will be deployed as required. Traps will be “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 technicians consider there is imminent danger to seabirds from a feral cat. They will be deployed well away from any established tourist areas or trails. When set, traps will be checked at least every 24 hours.

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.
- DOFAW and NARS are working on a system which will equip traps with cameras and radio transmitters, advising technicians by text when the traps are triggered and showing the predator caught. The KSHCP may be able to deploy this technology once it becomes available, saving a great deal of staff time and reducing human presence and scent along trails. If this occurs, 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 will be necropsied and stomach contents will be 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 Prime Contractor staff will include the necessary training and permitting.

11.3 Creation of Social Attraction Site

2.A. Permanent, predator-proof fence constructed and social attraction equipment (nest boxes, speakers) installed at the mitigation site in Year 1 of KSHCP program implementation.
2.B. 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.
2.C. Ground activity by Covered Seabirds documented at the mitigation site by Year 4 of KSHCP program implementation.
2.D. Breeding activity by Covered Seabirds documented at the mitigation site by Years 5-7 of KSHCP program implementation.

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).

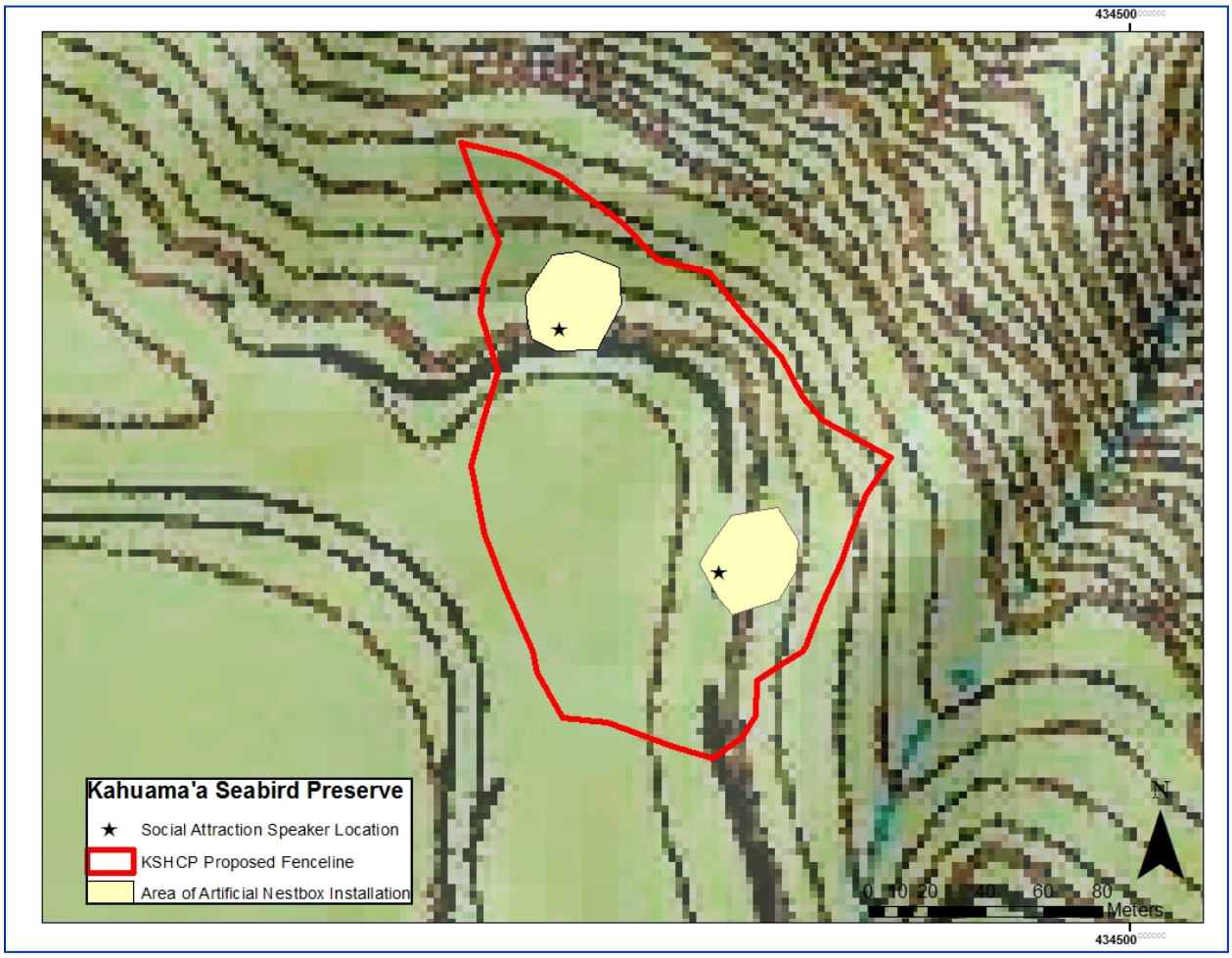


Figure 11.2. Map of Speaker System and Artificial Burrow Locations

11.3.1 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).

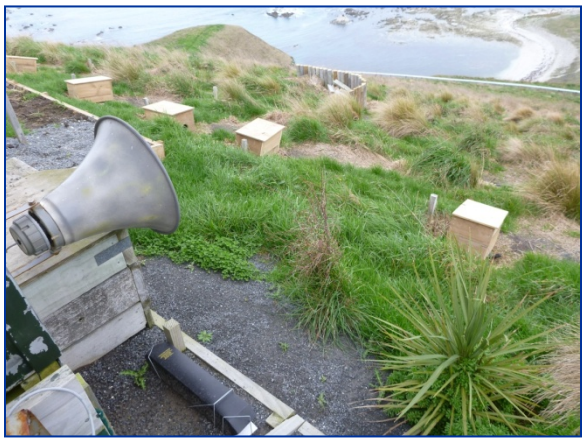


Figure 11.3. Social attraction speaker system and nest boxes at Hutton’s shearwater colony, Kaikoura, New Zealand. A. Raine

11.3.2 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. V**egetation and slope in the "bowl" section of the site, where part of the artificial burrows will be installed.**

11.3.3 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. Prime Contractor 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, Prime Contractor staff will consult regulatory agencies and initiate adaptive management outlined in the KSHCP if required.

11.3.4 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.

11.4 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.

11.4.1 Background

The Kahuamaʻa 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 (Table11.1) are present at the Kahuamaʻa Seabird Preserve.

Table 11.1. Seabird Habitat Modifiers

Common Name	Scientific Name	Priority
Strawberry guava	*Psidium cattleianum*	*1*
Himalayan (kahili) ginger	*Hedychium gardnerianum*	*1*
Australian tree fern	*Sphaeropteris cooperi*	*1*
Blackberry	*Rubus argutus*	*2*
Banana poka	*Passiflora tarminiana*	*2*
Bush beard grass	*Schizachyrium condensatum, Andropogon spp.*	*2*
Koster's curse	*Clidemia hirta*	*2*
Daisy fleabane	*Erigeron karvinskianus*	*3*
Air plant	*Kalanchoe pinnata*	*3*

This list will 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 Kahuamaʻa 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 Kauaʻi 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 Prime Contractor will seek partnerships with universities and other interested research organizations who may desire to capitalize such opportunities.

11.4.2 Eradication / suppression of seabird habitat modifiers

Vegetation work at the Kahuamaʻa 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.*[3]), 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.

Conversely, native vegetation is likely to offer suitable appropriate vegetative structure to facilitate breeding (Asner G.P et al. 2008, Duffy 2010), while the structural root components of native trees provide burrow stability (Gilham 1961, Ainley et al. 1997, Underwood and Bunce 2004). Native trees also provide a launch pad for take-off (Ainley et al. 1997, Sullivan and Wilson 2001).

For the 30-year duration of the Program, Prime Contractor 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).

11.4.2.1 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.

[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.

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

Seabird habitat modifier	Scientific Name	Removal Method	Maintenance	Harm Minimization
Strawberry Guava	*Psidium cattleianum*	Trees "frilled" (notched girdling technique). Fill cuts with Garlon application using lab squirt applicator bottle / brush or use tool to pry strawberry guava < 2.5cm in diameter out of ground.	Drizzle spray Garlon on reemerging plants (TNC, 2015) (Trees currently not in large groves)	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.
Himalayan (Kahili) Ginger	*Hedychium gardnerianum*	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)	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) 4) to be carried out by trained staff not volunteers
Australian Tree Fern	*Sphaeropteris cooperi*	Manually remove by chopping with a machete and crushing the apical meristem	Should not resprout but follow up removal will be required due to presence of spores and new individuals	
Banana Poka	*Passiflora tarminiana*	Manually remove by pulling up with roots	Entire vine will die from uprooting but seeds are long-lived so ongoing uprooting required.	

Blackberry	*Rubus argutus*	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
Bush Beard Grass	*Schizachyrium condensatum*, Andropogon spp.	Spray application of Roundup Pro	Spray application of Roundup Pro	1) Careful application 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
Koster's Curse	*Clidemia hirta*	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
Daisy Fleabane	*Erigeron karvinskianus*	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
Air Plant	*Kalanchoe Pinnata*	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

11.4.3 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

11.4.3.1 Methods

- 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 viscoa*) 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.

11.4.4 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

Action	Target Year 1	Target Year 5	Target Year 10	Target Year 15	Target Year 20	Target Year 30
% of Tier 1 & 2 seabird habitat modifiers removed across site (vs baseline)	≤50% cover	≤20% removed	≤5% cover of these species	≤5% cover of these species	≤5% cover of these species	≤5% cover of these species
% of Tier 1 & 2 invasive plants per veg plot	Target to be set once baseline established	Target to be set once baseline established	Target to be set once baseline established	Target to be set once baseline established	Target to be set once baseline established	Target to be set once baseline established

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 Prime contractor. 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).

Monitoring to ensure that objectives 2, C, D, E and F have been met are further defined in Table 12.1.

Table 12.1: Definitions of KSHCP Objectives.

	Objective	Definition
2C	2.C. Ground activity by Covered Seabirds documented at the mitigation site by Year 4 of KSHCP program implementation.	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.
2D	2.D. Breeding activity by Covered Seabirds documented at the mitigation site by Years 5-7 of KSHCP program implementation.	• Egg, chick, or incubating adult noted within the site • 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). • Signs of digging/trampling, feathers, guano, or an egg shell • Evidence of predation or nest failure
2E	2.E. Cumulative upward trend in Covered Seabird breeding documented at the mitigation site by Year 10-12 of KSHCP program implementation.	Increased number of active burrows (artificial or natural) compared to years 5-7
2F	2.F. Continued cumulative upward trend in Covered Seabird breeding documented at the mitigation site by Year 20 of KSHCP program implementation.	Increased number of active burrows (artificial or natural) compared to years 10-12

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

Biological Objectives	Monitoring Frequency During Normal Operation
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 / Honopū / 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:
    - All: Camera traps will be checked to look for predators
    - 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.
    - 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.
    - 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.
    - 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

- Prime Contractor staff will be trained in plant identification.
- A baseline plant inventory will be carried out by a suitably qualified consultant (with the assistance of Prime Contractor 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 12.3: Targets for Vegetation Monitoring

Action	Target Year 1	Target Year 5	Target Year 10	Target Year 15	Target Year 20	Target Year 30
% and composition of native plants per veg plot	Target to be set once baseline established	Target to be set once baseline established	Target to be set once baseline established	Target to be set once baseline established	Target to be set once baseline established	Target to be set once baseline established
% and composition of seabird habitat modifiers per veg plot	Target to be set once baseline established	Target to be set once baseline established	Target to be set once baseline established	Target to be set once baseline established	Target to be set once baseline established	Target to be set once baseline established
Listed plants - damage from project	0	0	0	0	0	0

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 Prime Contractor 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.

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:
    - Appropriate shearwater-sized banding pliers;
    - Spreader pliers;
    - Pesola 1000 g scale;
    - 15 clean bird weighing bags;
    - Wing chord ruler;
    - Banding leg gauge;

- USGS issued bird bands size #4 (50) for ‘a‘o and 3A (50) for ‘ua‘u;
- 15 clean bird handling towels;
- Pens and pencils
- Banding logbook or notebook and iPad with custom built banding app (KESRP).
- Umbrella or tarpaulin in case of rain during banding
- 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 ʻaʻo are the primary focus, ʻuaʻu and ʻakēʻakē will also be recorded.) ʻAʻo are more vocal in the morning; ʻuaʻu and ʻakēʻakē 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 ʻaʻo (and ʻuaʻu and ʻakēʻakē 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 ʻaʻo and ʻuaʻu.

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 Kauaʻi. 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

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) 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 12.5: Seabird Response – Monitoring Frequency

Biological Objectives	Monitoring Frequency
2.C. Ground activity by Covered Seabirds documented at the mitigation site by Year 4 of KSHCP program implementation. 2.D. Breeding activity by Covered Seabirds documented at the mitigation site by Years 5-7 of KSHCP program implementation. 2.E&F. Cumulative upward trend in Covered Seabird breeding documented at the mitigation site by Year 10 and 20 of KSHCP program implementation.	- Cameras installed by end Mar and checked monthly 01 Apr to 15 Dec - Auditory surveys with night vision: 2 surveys 4 nights monthly (Jun to Aug) (to year 7) - Burrow monitoring monthly 15 Apr -15 Dec - Chicks banded 2-4 weeks before fledging; adults banded whenever encountered. - Song meters from year 4 (May to Jul / Aug)

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

Obj		
All		
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 CO_2, 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.

Bio Obj	Action	No. per month	Season
	Fieldwork		
2A	Fence checks (additional checks will happen as part of rodent control outside fence)	1	all
2A	Fence maintenance, crisis response	1	all
All	Return drive to site	4	all
2B	Rodent trapping - Goodnature Check: 25 inside fence, 16 outside fence in 50m zone, rebaiting, counter check, CO_2 check	1	all
2B	Ink card tracking tunnel (25)	1	all
2B	Rodent trapping - Snap trap check (25) removal of carcass, bait and reset - 50m zone outside fence	2	all
2H	Feral cat trapping – fenceline (8) - opening & closing traps	2	all
2H	Feral cat trapping – fenceline (8) - checking & rebaiting	8	all
2H	Feral cat trapping – fenceline - camera trap (4) check (change cards and batteries) - occur at same time as cat trap checks	1	all

2H	Barn owl reduction - trapping (6)	4	all
2H	Barn owl reduction - shooting	4	all
2H	Feral cat control Kalalau valley - opening & closing traps, 30 live feral traps, 24 conibears, 20 legholds	2	all
2H	Feral cat control Kalalau valley 30 live feral traps, 24 conibears, 20 legholds - checking once open & rebaiting	8	all
2H	Feral cat control Kalalau valley - camera trap (20) check (change cards and batteries)	1	all
2G	Vegetation monitoring (veg plots), seabird habitat modifier removal, outplanting of native species if required	1/year	outside seabird season
2G, 2B	Maintain low vegetation in predator defense zone	2	
2C-F	Seabird monitoring - auditory surveys with night vision 2 x a night (am and pm), 4 locations, 4 nights	4/month x twice a day	inside breeding season only, Jun-Aug
2C-F	Seabird monitoring - camera traps (20) cards and battery changed	1	inside breeding season only, 15 Mar – 15 Dec
2C-F	Seabird monitoring - song meter (1) cards and battery changed.	1	Jun 01 –Nov 30 only
2C-F	Seabird monitoring - burrow searching (incubation to fledging)	1	Jun - Nov
2C-F	Seabird monitoring - burrow monitoring (100 artificial, tba natural), annual cleaning	1	Mar - Dec
2C-F	Seabird monitoring - chick banding (during burrow monitoring, 2-4 weeks before fledging only; also adhoc banding of any adults encountered.)	1	Oct - Dec
2A,C, D	Check speaker system & song meter alternation system	1	Mar - Dec
	Office		
2B	Rodent trapping - Log results from Goodnature (transf. from iPad) / analysis	1	all
2B-F	Camera traps - watch cameras (20) and log data (30 mins per camera) / analysis	1	all
2B	Ink card tracking tunnel (25)	1	all
2H	Feral cat trapping - log results (tranf. from iPad) / analysis	1	all

2H	Feral cat trapping – Reconyx camera trap - watch cameras and log data (20 mins per camera) / analysis (included with rodent work)	2	all
2H	Barn owl reduction - trapping (6) - log results (transf. from iPad) / analysis	1	all
2H	Barn owl reduction - shooting - log results (transf. from iPad) / analysis	1	all
2G	Invasive plant monitoring and removal - log results / analysis	1	outside breeding season
2G	Vegetation monitoring - veg plots and transect - log results (transf. from iPad) and analysis	1	outside breeding season
2C-F	Seabird monitoring - auditory surveys. Log data (transf. from iPad) and analysis	1	during breeding season only
2C-F	Seabird monitoring - song meter (1) cards to CM, review results	1	Jun 01 –Nov 30 only
2C-F	Seabird Monitoring - burrow searching. Log results (tranf. from iPad) and analysis	1	Jun-Nov
2C-F	Seabird monitoring - burrow monitoring (100 artificial, tba natural). Log results (tranf. from iPad) and analysis	1	Mar - Dec
2C-F	Seabird monitoring - chick banding (during burrow monitoring, 2-4 weeks before fledging). Log results (tranf. From iPad) and analysis	1	Oct - Dec
	Project management, including annual reports, progress reports, stakeholder management, staff management, budgeting	4	
	Permit & certification renewals (e.g. pesticide, rodenticide, firearms)	1	
	RCUH training / first aid etc.	1	
	ESCR presentations – one per year		
	Other admin	1	

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 Kahuamaʻa 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 Prime Contractor, 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 Kahuamaʻa 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 Prime Contractor 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 Kahuamaʻa 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 Kahuamaʻa Seabird Preserve is also important for the KSHCP as income is dependent upon Applicant take. For that reason, the full budget has 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

KSHCP Objectives		
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.	Fence construction. delayed by unforeseen event	Additional funds to contractor - 15% more labor @ low cost
	Fence design not adequate to exclude predators & repairs needed	Additional materials & labor needed to rebuild fence
	Additional rare plants found, work delayed	Additional funds to contractor - 15% more labor
	Archaeological remains found, work delayed	Additional funds to contractor - 15% more labor
	No suitably qualified fence contractor available in US to build fence in year one	Fly team from NZ or elsewhere
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	Predator removal unsuccessful at 1st attempt	Double trapping efforts inside fence - equipment

		Fly in and/ or consult with predator control expert
	Fence breach from tree fall, predators enter	Repair fence
		Repeat trapping effort inside fence
2.C. Ground activity by Covered Seabirds documented at the mitigation site by Year 4 of KSHCP implementation.	Monitoring insufficient	Increase camera trap effort by 20%
	Birds not attracted to site	Double speaker system & change soundtrack
	Birds not attracted to site	Fly in and/ or consult with expert from NZ
	Birds not attracted to site	Install decoys
2.D. Breeding activity by Covered Seabirds documented at the mitigation site by Years 5-7 of KSHCP implementation.	Monitoring insufficient	Increase camera trap effort by 20%
	Birds not breeding at site	Add new artificial burrows within fence
	Birds not breeding at site	Fly in and/ or consult with expert from NZ
	Birds not breeding at site	Survey for additional invasive plants that may be modifying habitat to make it unsuitable
	Birds not breeding at site	Replace all artificial burrows
2.F. Continued cumulative upward trend in Covered Seabird breeding documented at the mitigation site by Year 20 of KSHCP program implementation.	see 2D	
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.	Initial pass at habitat modifier removal fails	Repeat
	Additional invasive plant found	Removal effort

	Habitat modifiers persist despite technician maintenance work	Repeat removal pass
	Removal work is more expensive than predicted due to e.g. presence of additional rare plants	Additional funds
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.	No barn owls removed	Additional shooting nights
		Alternative trapping/luring techniques
	Barn owls kills still occurring in preserve	Additional shooting nights / new techniques

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:

- **Covered Species** – ʻAʻo, ʻuaʻu and ʻakēʻakē. The benefits to these species of the Kahuamaʻa Seabird Preserve have been outlined above. See individual BMPs on each activity for further details on how harm will be completely avoided.
- **Ōpeʻapeʻa**: This is a listed species (Federal and State). It could be present at the Kahuamaʻa 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 Hawaiʻi (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 Kahuamaʻa 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* (E, PEP), 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 ʻŌhiʻa Death (ROD),** a fungal disease, is currently attacking and killing ʻōhiʻa (*Metrosideros polymorpha*), the most abundant native tree in the state of Hawaiʻi. The fungus *Ceratocystis* was first detected in 2014 on the island of Hawaiʻi killing hundreds of thousands of ʻōhiʻa across thousands of acres on the island. It has more recently been found on the islands of Kauaʻi, Maui, and Oʻahu and has the potential to devastate the native forest. *Ceratocystis lukuohia* (destroyer of ʻōhiʻa) and *Ceratocystis huliohia* (disruptor of ʻōhiʻa), the two fungal pathogens causing ROD have been confirmed on both Hawaiʻi Island and Kauaʻi. Both species of *Ceratocystis* will kill ʻōhiʻa, however the more aggressive form has not been found on Maui or Oʻahu, and is extremely limited on Kauaʻi. In July 2019, a single tree was detected on Maui and another tree on the island of Oʻahu. Both were infected by *C. huliohia*. Sanitation protocols will occur to prevent the introduction and spread of ROD. 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 Kahuamaʻa 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 Kahuamaʻa 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 Kahuamaʻa Seabird Preserve will not result in take under section 10(a)(1)(B). The Prime Contractor will have conservation biology and project management experience and will hold recovery permits necessary to conduct its work under Section 10(a)(1)(A) of the Endangered Species Act and Sections 13-124-4 and 13-124-6 of the Hawaiʻi Administrative Rules.

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. The Prime Contractor will be made aware that failure to follow BMPs may result in legal and financial penalties. The Prime Contractor and staff will receive training 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 (e.g. 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 favorable 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 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, a Prime Contractor 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 Prime Contractor monitor once construction commences. If this occurs, however, Prime Contractor 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 Kahuamaʻa 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 Kauaʻi 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 Kahuamaʻa Seabird Colony as this species is a known seabird predator on Kauaʻi. 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. Prime Contractor 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 Kauaʻi.
- 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 programed 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 Kahuamaʻa 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 ʻōpeʻapeʻa. 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 ʻōpeʻapeʻa.

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 ʻiʻiwi (*Drepanis coccinea*) (federally listed as threatened under the ESA), ʻapanane (*Himatione sanguinea*), Kauaʻi ʻelepaio (*Chasiempis sandwichensis)*, Kauaʻi amakihi (*Hemignathus Kauaiensis*) and ʻanianiau (*Magumma parva*). ʻAnianiau and Kauaʻi ʻamakihi 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 Kahuamaʻa 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 ʻōhiʻa.

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 ʻōhiʻa. 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, a Prime Contractor 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 Kahuamaʻa 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 the Prime Contractor 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 the Prime Contractor 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. Prime Contractor 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 ʻŌhiʻa Death (ROD)

The spread of Rapid ʻōhiʻa Death (ROD) to local ʻōhiʻa trees could lead to a major ecological disaster through Kauaʻi. Local trees could potentially contract ROD due to staff or contractors bringing the disease to Kauaʻi 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 ʻōhiʻa wood or ʻōhiʻa parts inter-island. If ʻōhiʻa 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 ʻōhiʻa 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 Kahuamaʻa 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. Prime Contractor 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. Prime Contractor 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.
- Care will be taken not to introduce new non-native plants through construction and or monitoring activities by cleaning boots, clothes, packs and gear between site visits to ensure that seeds are not carried from other areas
- 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 and around the site..
- Every effort will be made to ensure that the area remains visually and structurally intact. Soil and vegetation disturbance will be kept to a minimum. Where damage to the ground cover is unavoidable from invasive species removal, replanting with native plants will be carried out.
- 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 17.4.3.

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

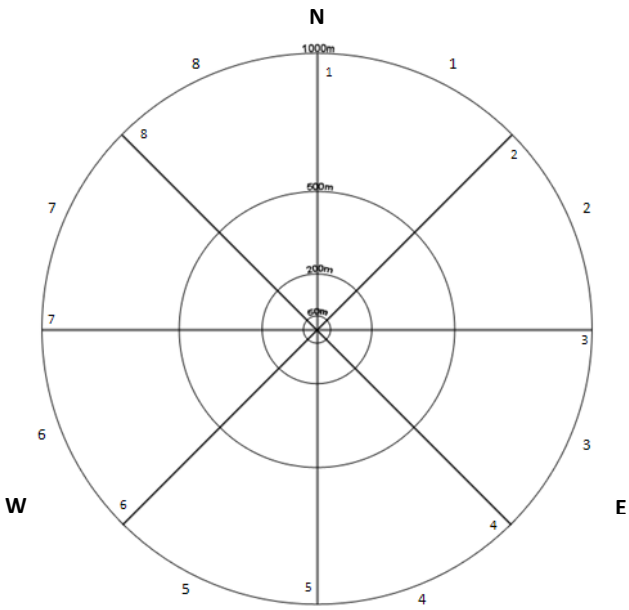
Impacts will be completely avoided using BMPs during pre-construction work as follows:

- All ground disturbing clearing efforts will be monitored by an archaeologist so that any potential surface archaeological sites are not disturbed, especially in the event that heavy equipment is used. Alternately, all clearing activities that do not disturb the ground surface will be inspected by an archaeologist immediately following the clearing to determine the presence or absence of sites;
- The installation of fences will be monitored by an archaeologist to assure that potential surface features as well as potential subsurface cultural deposits are not disturbed by these activities;
- If at any time during development of the mitigation site archaeological features are encountered, State Parks archaeologists will be notified. If activities could impact any archaeological feature, these activities will cease until such time as the feature is evaluated by a qualified archaeologist; and

- If activities extend into the steep cliff portion of the project area, the potential for encountering rock shelters or caves (features known to be used by Hawaiians for interment of the dead) does exist. In the event that human remains are inadvertently discovered, those remains shall not be disturbed and the State Historic Preservation Division (SHPD) immediately notified in accordance with HRS Chapter 6E.
- 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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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, Kaua‘i PEPP Coordinator, Kaua‘i Plant Extinction Prevention Program.
Dr. Andre Raine, 2017, Manager, Kaua‘i Endangered Seabird Recovery Project.
Galen Reid, 2016, Predator Control Specialist, DOFAW.
Kyle Pias, 2017, Co-ordinator, Hono O Nā Pali Seabird Mitigation Project.
Adam Williams, 2017, DOFAW.
Dr. Lindsay Young, 2017, Vice President and Executive Director, Pacific Rim Conservation.

Appendix B:
Biological Details

APPENDIX B: COVERED SPECIES BIOLOGICAL DETAILS

1. 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.

1.1. ‘A’o

The ‘aʻo or Newell’s Shearwater (*Puffinus newelli*) is endemic to Hawaiʻi and most of the current-day population breeds on the island of Kauaʻi. The species is listed as ‘Threatened’ under Federal and State of Hawaiʻi endangered species laws and ‘Endangered’ on the International Union for Conservation of Nature (IUCN) Red List of Threatened Species (Birdlife International 2010). The ‘aʻo belongs to the *Puffinus* genus of small shearwaters which includes the Manx shearwaters (*Puffinus puffinus*) and the Townsend’s Shearwaters (*Puffinus auricularus*).

The ‘aʻo is a small, black and white shearwater with a dark tail (**Figure 1-1**). As with most shearwater species, the ‘aʻo 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 ‘aʻo 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 Kaua‘i), where no surveys have been permitted.

1.1.1. 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).

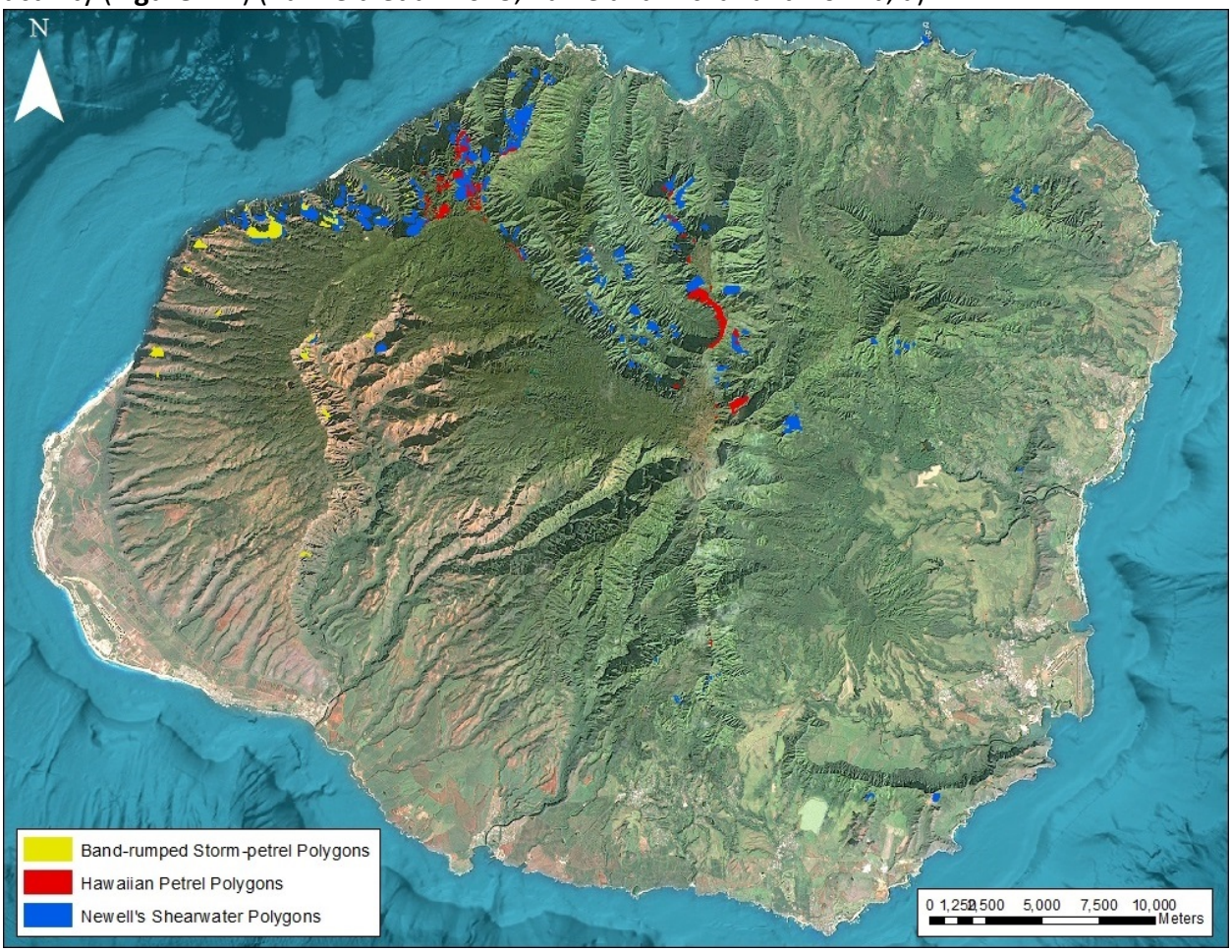

Figure 1-2. Map of ground calling locations, indicating Calling Hotspots and breeding activity on Kaua‘i. ‘A‘o (in blue), the ‘ua‘u (in red), and the ‘akē‘akē (in yellow) (KESRP).

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.

1.1.2. 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).

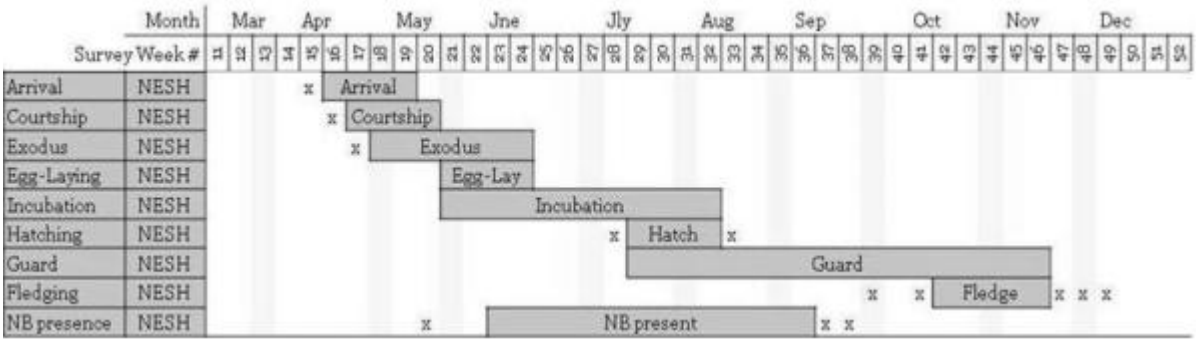

Figure 1-3: Breeding phenology of the ‘ua‘u (HAPE) and the ‘a‘o (NESH) on Kaua‘i adapted from Deringer (2009). NB = non-breeders. Outlier observations indicated with “X”s.

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. ‘A‘o 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 ± 0.17SD (n=17) in areas where predators were present and was 0.62 ± 0.08SD (n=9) for areas where predators were eradicated. KESRP conducted a study in Upper Limahuli Preserve, a site in Kaua‘i 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 ‘a‘o went from 54.5% in 2011 to a high of 88.2% in 2015 from nests where breeding was confirmed; ‘ua‘u 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: ʻAʻo and ʻuaʻu habitat: ōhiʻa lehua tree root structure for burrows. Photo: P Belson.

Figure 1-6: ʻAʻo and ʻuaʻu habitat: ʻuluhe fern with burrow. Photo: A Raine.

Figure 1-5: ‘A‘o and ‘ua‘u habitat”: intact native montane forest (Upper Limahuli Preserve). Photo: Y Reiss, left. A Raine, right.

1.1.3. 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.**

1.2. ‘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).

Figure 1-7: The ʻUaʻu – Hawaiian Petrel. Photo A. Raine, KESRP

1.2.1. Distribution, Abundance and Population Trends of the ʻUaʻu

The ʻuaʻu only breeds in the Southeastern Hawaiian Islands. It is thought that the species once bred on all the main islands of Hawaiʻi, except Niʻihau (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 Kauaʻi at high-elevation nesting colonies. Smaller populations breed on the islands of Hawaiʻi and possibly Molokaʻi (this has not been confirmed). There is also a large breeding population on the island of Lānaʻi (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 Kauaʻi 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 ʻuaʻu on Kauaʻi. The ridges and slopes along the northwest coast of Kauaʻi display the highest levels of ʻuaʻu 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 ʻuaʻu 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 difference 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 Kaua‘i 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)

1.2.2. 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 s**ummarizes 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.

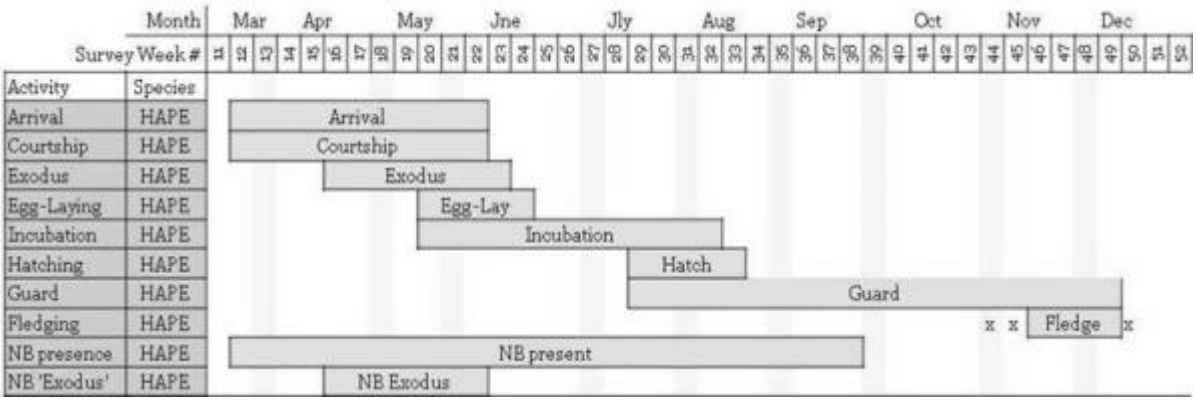

Figure 1-8: Breeding phenology of the ‘ua‘u (HAPE) on Kaua‘i adapted from Deringer (2009). NB = non-breeders. Outlier observations indicated with “X”s.

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. ʻUaʻu breeding on the islands of Hawaiʻi, Maui, and Lānaʻi fledge young earlier (early November) than those breeding on Kauaʻi (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, ʻuaʻu 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 ʻuaʻu nests in burrows, crevices in lava, and under ferns. Nesting habitat on Kauaʻi appears structurally similar to known breeding sites on Lānaʻi (Penniman 2010, Wiley et al. 2012). On Lānaʻi, ʻuaʻu burrow primarily in fern beds (VanZandt et al. 2014, Raine et al. 2017h). In comparison, nest burrows on Maui and Hawaiʻi 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 Kauaʻi, the ʻuaʻu burrows at high-elevation sites comprised of predominantly wet montane forest of native vegetation, under ʻŌhiʼa and Lapa lapa trees, similar to that of used by the ʻaʻo but typically higher in elevation (Holmes and Joyce 2009).

As described by Troy et al. (2016), when compared to ʻAʼo, ʻuaʻu burrows are associated with softer soils, lower surrounding vegetation and are closer to wind exposed ridges. ʻUaʻu 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).

1.2.3. Threats to the Continued Existence of the ʻUaʻu

The primary threats to the ʻuaʼu population on Kauaʻi 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.

1.3. ʻAkēʻakē

The ʻakēʻakē, or Band-rumped Storm-petrel (*Oceanodroma castro*), is a small, highly pelagic storm-petrel of the Family Hydrobatidae. The ʻakēʻakē is listed as endangered under the Federal ESA, as well as the State of Hawaiʻi endangered species law. The Hawaiian population of the ʻakēʻakē 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 and the Hawaiʻi 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 ʻakēʻakē is a very small seabird with a total length of about 20cm and weighs 33-67g. The plumage of the ʻakēʻakē 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.

Figure 1-9: ʻAkēʻakē – Band-rumped Storm-petrel. Photo T Anderson, SOS.

1.3.1. Distribution, Abundance, and Population Trends

The ʻakēʻakē 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.

ʻAkēʻakē populations across the Pacific are isolated from each other. Extensive at-sea surveys of the Pacific near Hawaiʻi have revealed a broad gap in distribution of the ʻakēʻakē to the east and west of Hawaiʻi (del Hoyo et al. 1992, Slotterback 2002, Naughton et al. 2005). The Hawaiʻi 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, ʻakēʻakē from Kauaʻi were compared with other ʻakēʻakē from around the world. The results suggest that birds from Kauaʻi are genetically distinct from other populations (Taylor et al. in prep).

The ʻakēʻakē 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 ʻakēʻakē bones found in middens on the island of Hawaiʻi, and in excavation sites on Lehua, Oʻahu, and Molokaʻi, ʻakēʻakē 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 ʻakēʻakē populations (Naughton et al. 2005).

The total global population of the Band-rumped Storm Petrel is estimated at approximately 150,000 individuals (Brooke 2004). Kauaʻi supports most of the breeding population of Hawaiʻi 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 Kauaʻi. Additionally, retrieval of downed fledglings on Kauaʻi 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, Hawaiʻi, Lehua and Kahoʻolawe (Johnston 1992a, b, Wood et al. 2002). Breeding has recently been confirmed on the slopes of Mauna Loa on Hawaiʻi (Galase et al. 2016), and on Lehua Islet a single, mummified fledgling was found in 2002 (VanderWerf et al. 2007). Specimens of the ʻakēʻakē have been collected from Niʻihau 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 Hawaiʻi (Harrison 1990).

1.3.2. Life History and Habitat Selection

Breeding phenology of the ʻakēʻakē on Kauaʻi 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). ʻAkēʻakē 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 ʻakēʻakē 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 Hawaiʻi in the Phoenix Islands, as well as the entire distance from the Hawaiian Islands to Japan (Slotterback 2002, Mitchell et al. 2005).
ʻAkēʻakē 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 ʻakēʻakē 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 ʻakēʻakē of the Hawaiian Islands (Mitchell et al. 2005).

Preferred nesting habitat for the ʻakēʻakē breeding population on Kauaʻi 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.

1.3.3. Threats to the Continued Existence of the ʻAkēʻakē

The primary threats to the ʻakēʻakē population on Kauaʻi 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**.**

1.4. Threats Affecting Covered Seabirds

Present day populations of seabirds in Hawaiʻi 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 Kauaʻi 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 ʻaʼo, ʻuaʻu, and ʻakēʻakē populations on Kauaʻi.

1.4.1. Predation at Breeding Colonies

One of the most serious threats to the survival of seabirds on Kauaʻi 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 Kauaʻi (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 Kauaʻi 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 ʻakēʻakē. These include feral cats, the small Indian mongoose on the Hawaiian Islands other than Kauaʻi, the non-native barn owl, and both Black and Polynesian Rats. A dead adult ʻakēʻakē 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 ʻakēʻakē nest sites on Kauaʻi 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 Kauaʻi 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 Kauaʻi. Until recently it was thought that the mongoose was not established on the island of Kauaʻi. 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 Kauaʻi 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 ʻuaʻu, ʻaʻo, and the ʻakēʻakē on Kauaʻi 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 ʻuaʻu and the ʻaʻo 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).

1.4.2. Habitat Degradation

Seabird nesting habitats on Kauaʻi 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 Kauaʻi'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.

1.4.3. 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.

1.4.3.1. 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.

1.4.3.2. 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).

1.4.3.3. 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).

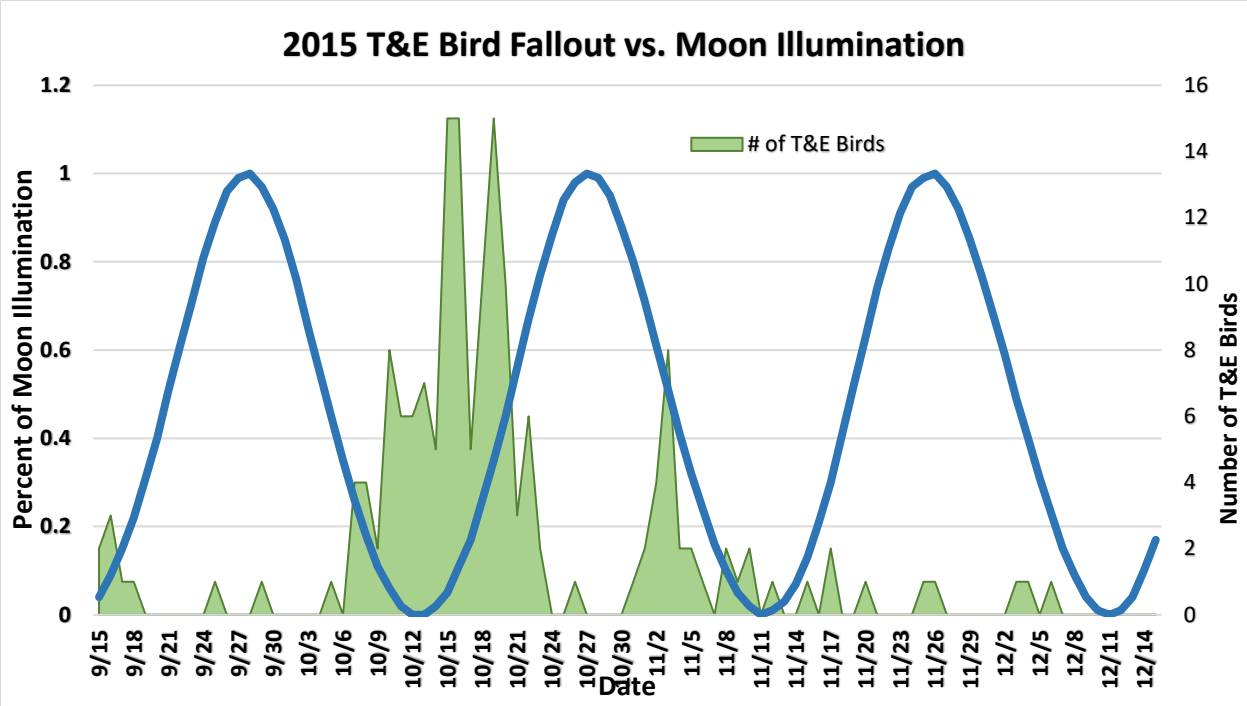

Figure 1-10: 2015 Threatened and Endangered (T&E) seabird fallout and moon illumination**.**

1.4.3.4. 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.

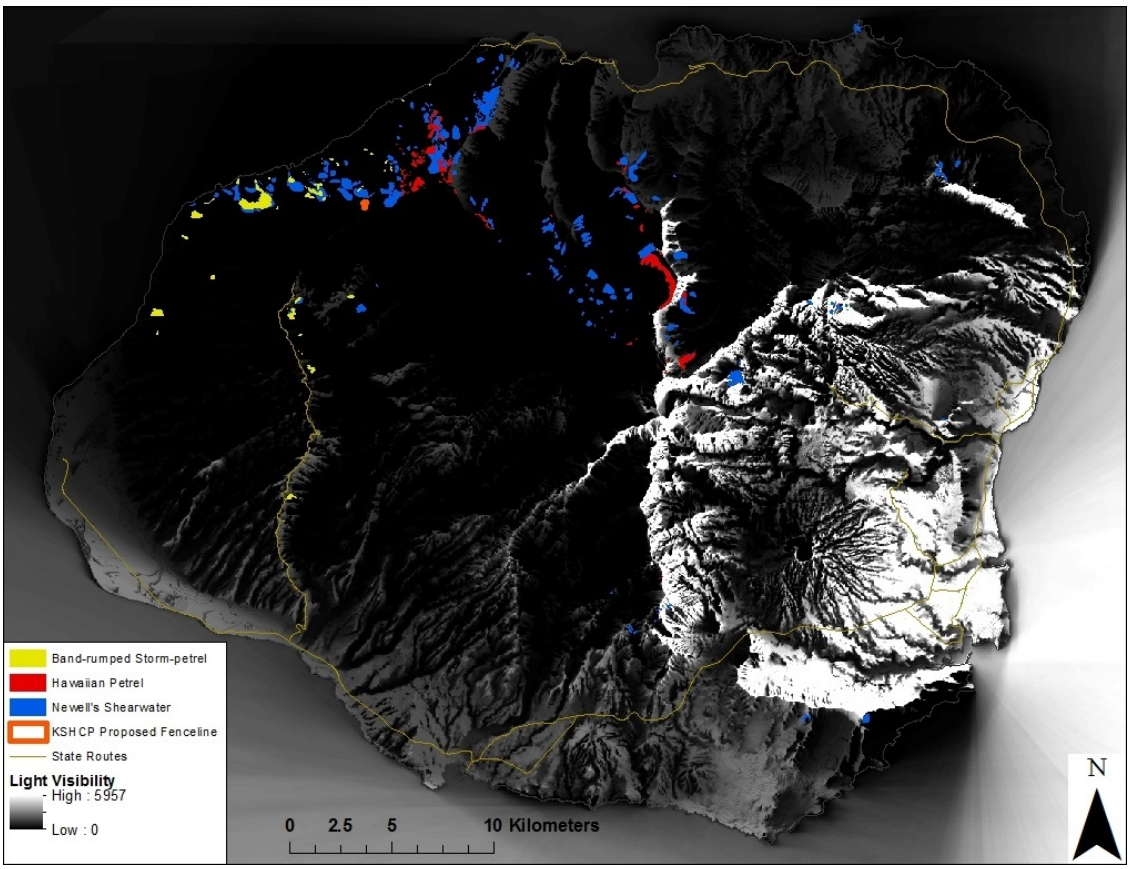

Figure 1-11: Light pollution measured via satellite overlaid with locations of active and inactive shearwater colonies. Source of light information: Troy et al. (2011); Source for colony locations: KESRP.

1.4.4. 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.

1.4.5. 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.

1.4.6. 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).

1.4.7. 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.

1.4.7.1. Changing Ocean Conditions and Seabird Foraging

An El Nino/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**).

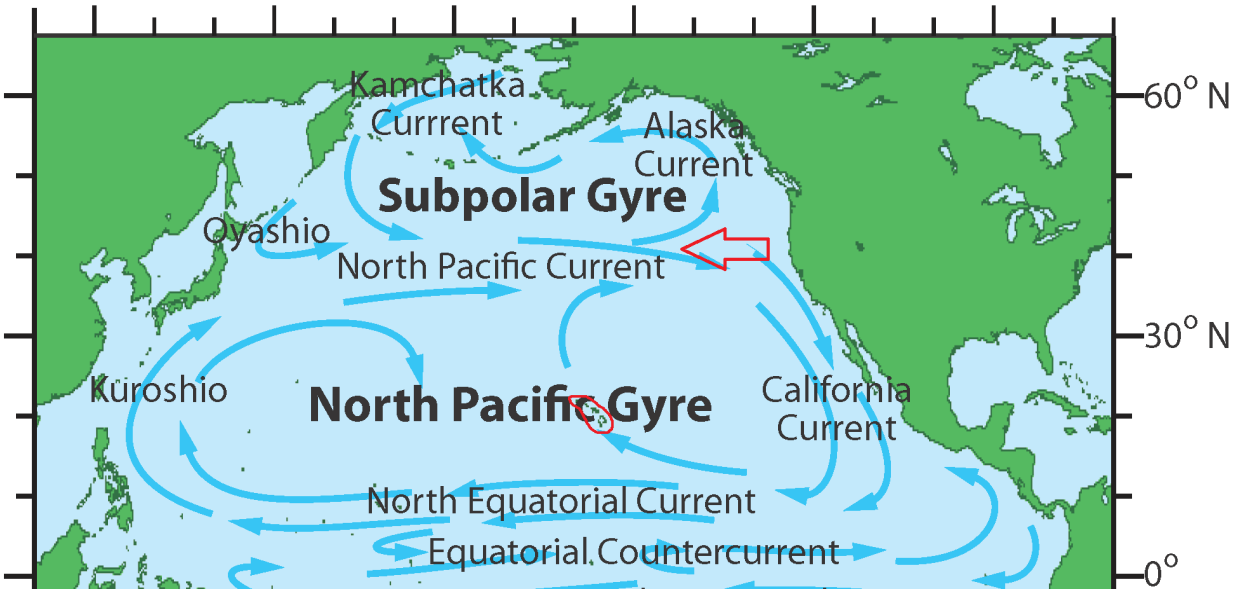

Figure 1-12: System of gyres and currents in the North Pacific. The main Hawaiian Islands are circled in red. The red arrow points to the Transition Zone where the subpolar and subtropic gyres mix. Figure credit: http://www.seos-project.eu/modules/oceancurrents/oceancurrents-c02-p04.html

With regards to the temperate feeding grounds of the ʻuaʻu and possibly the ʻakēʼakē, 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 ʻuaʻu 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 ‘a’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 ‘a‘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 ‘a‘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).

1.4.8. 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 ʻaʻo 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 Hawaiʻi 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 (Hawaiʻi 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).

1.5. Honu – Green Sea Turtle

1.5.1. 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 Hawaiʻi Revised Statues Chapter 195D and Hawaiʻi 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 Hawaiʻi (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 sub-dermal 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 1-13: Female honu or Hawaiian Green Turtle laying a nest. Photo www.turtletracks.org.

The honu in Hawaiʻi 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 Hawaiʻi, with over 40 years of data showing that the Hawaiʻi population has increased at a rate of approximately 5.7% annually since the harvest limits were imposed in 1974, (under State of Hawaiʻi 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).

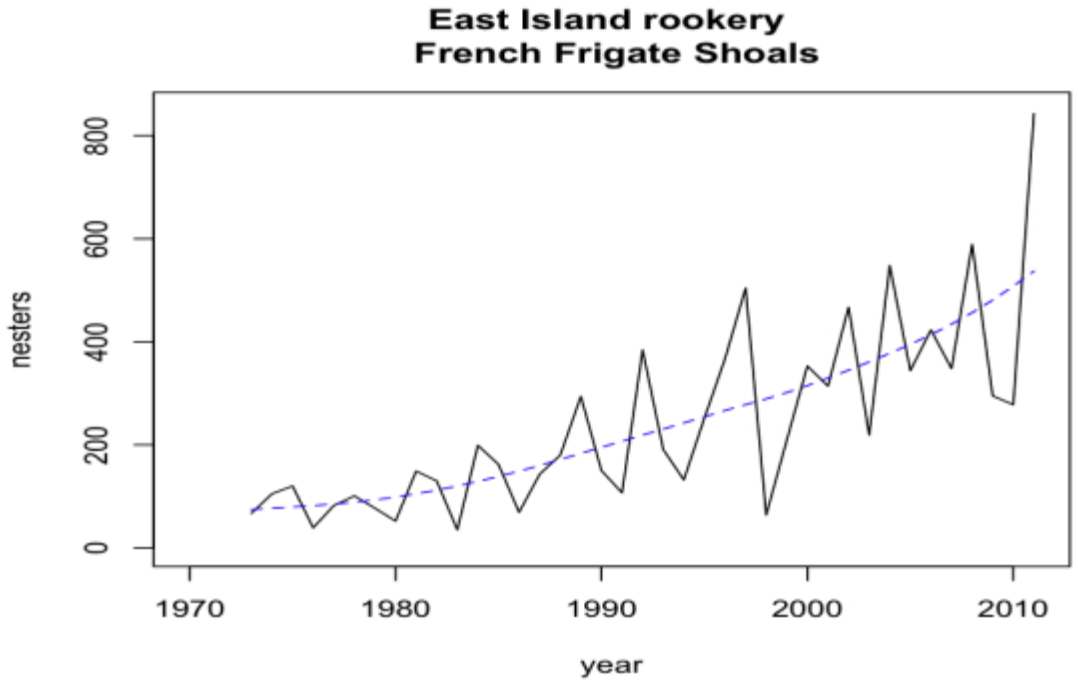

Figure 1-5: Estimated number of Hawaiian green turtles nesting at East Island, French Frigate Shoals, NWHI, 1973-2011. Table source: NMFS Pacific Islands Fisheries Science Center Marine Turtle Research.

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 Hawaiʻi staff biologists and NOAA volunteer observers has documented increasing levels of honu nesting on Kauaʻi. Terrestrial basking by honu is also reportedly on the rise in the other main Hawaiian Islands. On Kauaʻi, 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 Kauaʻi where coastal light pollution exists.

1.5.2. 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 Kauaʻi 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 Hawaiʻi. 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, Balasz 1996, Parker and Balazs 2010).

1.5.3. 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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3. 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, Kaua‘i Endangered Seabird Recovery Project.

Appendix C:
Social Attraction Benefit Estimator

Appendix C. Social Attraction Benefit Estimator

MODEL TO ESTIMATE SOCIAL ATTRACTION SITE (SAS) BENEFIT TO THE NEWELL'S SHEARWATER (*Puffinus 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 Kahuamaʻa Seabird Preserve were created to specifically reflect estimated levels of predation for Newell's Shearwater on the Island of Kauaʻi. 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 Kauaʻi (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 Kalaheo 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 m^2) 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 in 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.

	Associated Slope (%)
Minimum	.62
1st Quartile	14.9
Median	21.6
3rd Quartile	29.9
Maximum	45

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 of 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.

Model parameter	Calculation	Input for KSHCP model
Burrow Capacity	[Total hectares suitable habitat * estimated natural burrow density] + proposed number of artificial burrows to be installed	1.2 ha * 0.058 burrows/m² = 696 + 100 (artificial burrows) = 796 (Total burrow capacity at site)

Starting metapopulation size:
Description:
The population size for all Newell's Shearwaters on Kaua'i (metapopulation) is a critical model input as this is what 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 Hawaii 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 Kaua'i.

Model parameter	Calculation	Input for KSHCP model
Starting metapopulation size	[Joyce 2011 at-sea population estimates * .90 (% of total pop that is on Kaua'i) * .80 (% of total Kaua'i pop that is represented in flight path estimates)] – Estimated decline between 2006-2016	Year 1 Starting Metapopulation: Predation Scenario 2: 14,976 Predation Scenario 3: 11,184 Predation Scenario 4: 8647

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.

Parameter	Input used for KSHCP model	Notes
Fencing completion year	Year 2	Conservative estimate based on prep required
Start broadcasting year	Year 2	Conservative estimate based on prep required
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
Juvenile site fidelity	From outside the fence recruits: 85%; 90%; 95%	Thus 5%, 10% or 15% of the prospecting birds are potentially available for recruitment. Estimate derived from literature review.

	Inside the fence: 95%	Thus 5% of birds born within the fence will stray to other colonies to establish breeding.
Run time (in years)	50	

Size, location and topography of social attraction site	1.2 hectares	Derived from proposed fenceline at KSHCP social attraction site; linked to GIS file.
Artificial burrows to be installed	100	Estimated from field visits; accommodating 100 artificial burrows.
Total burrow capacity	796	See Table 2
Starting metapopulation size	Varies by Predation Scenario	See Table 3
Flight Path Overlap	For proposed Kahuamaʻa Seabird Preserve = 0.0311	Linked to GIS shapefile with site location and flight path .tif file provided by USFWS

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 Kahuamaʻa 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 Kauaʻi 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.

PARAMETER	NOTES	MODEL INPUT
Breeding probability	Estimated from the average of 15 data sets for Newell's Shearwater and proxy species (Griesemer & Holmes 2011).	0.88
Reproductive success	Estimated from the average of 38 data sets for proxy species (Griesemer & Holmes 2011)	Within fence = 0.81 Outside of fence = 0.35-0.52 (varies with predation scenario)
Age of first reproduction	Griesemer & Holmes 2011	6 years old
Age of last reproduction	Ainley et al. 2001	36 years old
Survivorship per age class	Griesemer & Holmes 2011	Year 0-1: 0.654 Year 1-2: 0.78 Year 2-3: 0.89 Years 3-5: 0.905 Year 6+: 0.92

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 8647 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.

			Population size at 50 Years	**Population size at 50 Years**	**Population size at 50 Years**
	Predation Scenario:	**Population Lambda**	**85% Site Fidelity**	**90% Site Fidelity**	**95% Site Fidelity**
Within fence	**2**	**1.08**	877	534	292
Outside fence	**2**	**0.973**	3811	3811	3811
Within fence	**3**	**1.08**	372	248	124
Outside fence	**3**	**0.945**	661	661	661
Within fence	**4**	**1.08**	189	126	63
Outside fence	**4**	**0.921**	141	141	141

			Population size at 50 Years	**Population size at 50 Years**	**Population size at 50 Years**
	Predation Scenario:	**Population Lambda**	**85% Site Fidelity**	**90% Site Fidelity**	**95% Site Fidelity**
Outside fence	**2**	**0.973**	4370	4370	4370
Outside fence	**3**	**0.945**	877	877	877
Outside fence	**4**	**0.921**	213	213	213

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.

			Number of fledglings produced in 30 years	**Number of fledglings produced in 30 years**
	Predation Scenario:	**85% Site Fidelity**	**90% Site Fidelity**	**95% Site Fidelity**
Within fence	**2**	1385	923	462
Outside fence	**2**	340	226	114
Within fence	**3**	762	508	254
Outside fence	**3**	131	87	44
Within fence	**4**	457	304	152
Outside fence	**4**	58	38	19

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.

Modeled burrow capacity scenarios	Within fence total burrow capacity	Number of fledglings produced in 30 years within the fence (Predation scenario 2; Site fidelity 85%)	Within fence population size at 50 years (total individuals)
Estimated burrow capacity for 1.2 ha KSHCP site (see Table 2)	796	1045	877
Estimated burrow capacity for an expanded site (in same location) of 2.15 ha (0.058 burrows/m²	1253	1045	877
Estimated burrow capacity for 1.2 ha KSHCP site if burrow density was half (0.026 vs 0.058)	400	1045	877

DISCUSSION

The main of 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, in prep) 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.

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Appendix D: Participant Inclusion Plan (PIP) Template

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

List of Buildings	Type/Description of Lights Present	Location	Purpose of the Lights	Describe any measures implemented to avoid or minimize take impacts to Covered Species

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

List of Buildings	Type/Description of Lights Present	Location	Purpose of the Lights	Describe any measures implemented to avoid or minimize take impacts to Covered Species

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.		
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**
Are any of the Covered Activities (lights) visible from a beach?	**Yes / No**	**If yes, describe the specific lights (type, , height, purpose) & specific location; provide map & photos showing distance from beach**
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**

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

Artificial Light Attraction Alternatives to the Taking Considered	Reasons Alternatives are not Being Utilized (provide justification)
▪ **Deactivate all outdoor artificial lights from dusk to dawn during the fledgling fall-out season September 15 to December 15**	
▪ **Change operations to eliminate the need for outdoor artificial lighting (e.g., from nighttime to daylight hours)**	
▪ **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)**	
▪ **Other alternatives to the taking considered, if any. 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 *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: Seabird Light Attraction Minimization Measures Considered

Minimization Measures Considered	Feasible? (Y / N)	If not Feasible to Implement Measures, Provide Reason
▪ Change time of light use (lights off earlier)	Yes / No	
▪ Deactivate unnecessary lights	Yes / No	
▪ Replace all outdoor lights with full cut-off fixtures	Yes / No	
▪ Shield all outdoor lights with full cut-off shields	Yes / No	
▪ Angle all lights downward	Yes / No	
▪ Lower intensity (lumens) of outdoor lights	Yes / No	
▪ Change bulb color to non-white spectrum	Yes / No	
▪ Prohibit/control unleashed predatory animals; prohibit outdoor feeding of animals; require sealed rubbish containers	Yes / No	
▪ Provide Worker Seabird Awareness Training to staff	Yes / No	
▪ Provide outreach materials to staff & guests	Yes / No	
▪ Host Save Our Shearwaters (SOS) Aid Station	Yes / No	

Item 8. <u>Minimization Plans</u>. 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

List of Buildings	Minimization Measures	Cost to Implement	Responsible Staff	Timeline

Table 6: Seabird Mortality Minimization Plan

Minimization Measures	Describe minimization method (e.g. trapping, outreach, enact policy)	Cost to Implement	Responsible Staff
Remove & control loose predatory animals at the facility. (Loose animals can kill grounded seabirds and this measure aims to prevent seabird mortality by animals.)			
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.)			
Conduct nightly/morning searches to recover downed birds at the property & turn them into SOS following protocols (see monitoring plan below).			
Train staff to follow minimization measures.			

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

Please provide the following information for the protocol items below		
Item	**Protocol** (fill in protocol & provide reasons)	**KSHCP Guideline**
Percentage of the total property that will be searched & the total area to be searched		Search as much area as possible
Frequency of searches (# per day or per week)		Twice daily
Time of day of searches		2-3 hours after sunset, and within 3 hours after sunrise
Number of searchers per search area		Depends on site conditions and safety considerations and vegetation, nearby hazards/threats
Proposed training		Annual training covering seabird identification, seabird handling, response procedures, verified and documented

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)		
Item	**Protocol** (fill in protocol & provide reasons)	**KSHCP Guideline**
Location & description of the beach, or beaches, surveyed and the linear distance of the beach		Beach area surveyed should coincide with visibility from the facility with the lights
Frequency of searches (# per day or per week)		Weekly during nesting season (typ. May 15 to end of August)
Number of searchers per search area		Depends on site conditions and safety considerations
Proposed training		Searchers should receive annual training conducted by the DLNR or the USFWS, or their designee (See **item 9a)**

Table 9: Green Sea Turtle 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)		
Item	**Protocol** (fill in protocol & provide reasons)	**KSHCP Guideline**
Frequency of checks (# per day or per week)		Active nests should be monitored every 1-2 days; then daily during expected hatching date
Light avoidance		If lights cannot be deactivated or shielded from the nest, each nest should be screened from visible light
Number of searchers per search area		Depends on site conditions and safety considerations

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.
10. Complete the Bird Take Field Report.
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 10: Annual Take Calculation

	Newell's Shearwater	Hawaiian Petrel	Band-rumped Storm-petrel
1. Annual average number (SOS data – or – monitoring data) of downed NESH (5 most recent years), HAPE or BRSP (15 most recent years)			
2. Annual observed lethal take estimate (12% of 1, all downed birds)			
3. Annual unobserved lethal take estimate (e.g. 100% of 1, all downed birds if 50% searcher efficiency assumed)			
4. Total estimated annual lethal take from light attraction (2+3)			
Requested Annual Lethal Take			
Requested Take Over Permit Term			

Item 2. Select the requested take authorization and permit/license term coverage for each of the Covered Species.

Table 11: Newell's Shearwater:

Age Class	Annual Take Estimate: Fledglings	Annual Take Estimate: Adults or Sub-Adults	Take Limit for License/Permit Term
Mortality (Lethal)			
Injury (Non-lethal)			

Table 12: Hawaiian Petrel:

Age Class	Annual Take Estimate: Fledglings	Annual Take Estimate: Adults or Sub-Adults	Take Limit for License/Permit Term
Mortality (Lethal)			
Injury (Non-lethal)			

Table 13: Band-Rumped Storm Petrel:

Age Class	Annual Take Estimate: Fledglings	Annual Take Estimate: Adults or Sub-Adults	Take Limit for License/Permit Term
Mortality (Lethal)			
Injury (Non-lethal)			

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:

_____

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 –

Appendix B –

Appendix C –

Appendix D –

Appendix E –

Appendix F –

Appendix G –

Appendix H –

Appendix E: Guidelines for Adjusting Lighting at Facilities

APPENDIX E: Guidelines for Adjusting Lighting at Facilities

1. 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 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.

1.1. 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.

1.2. 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.

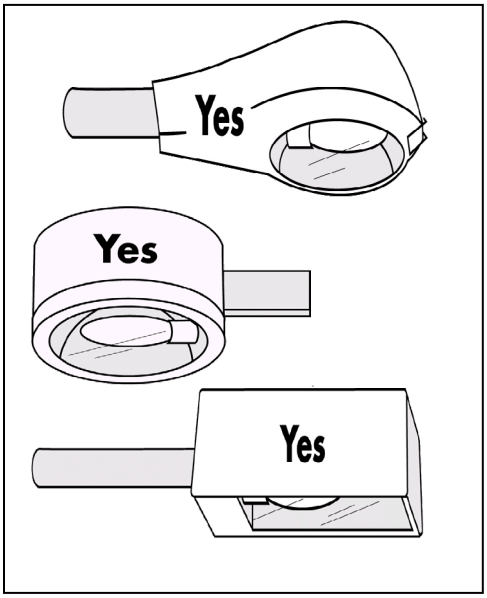

Figure 1: Examples of full cut-off light fixtures. Source: www.darksky.org.

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).

1.3. 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 2: Installation of an appropriately sized floodlight shield. Source: www.darksky.org.

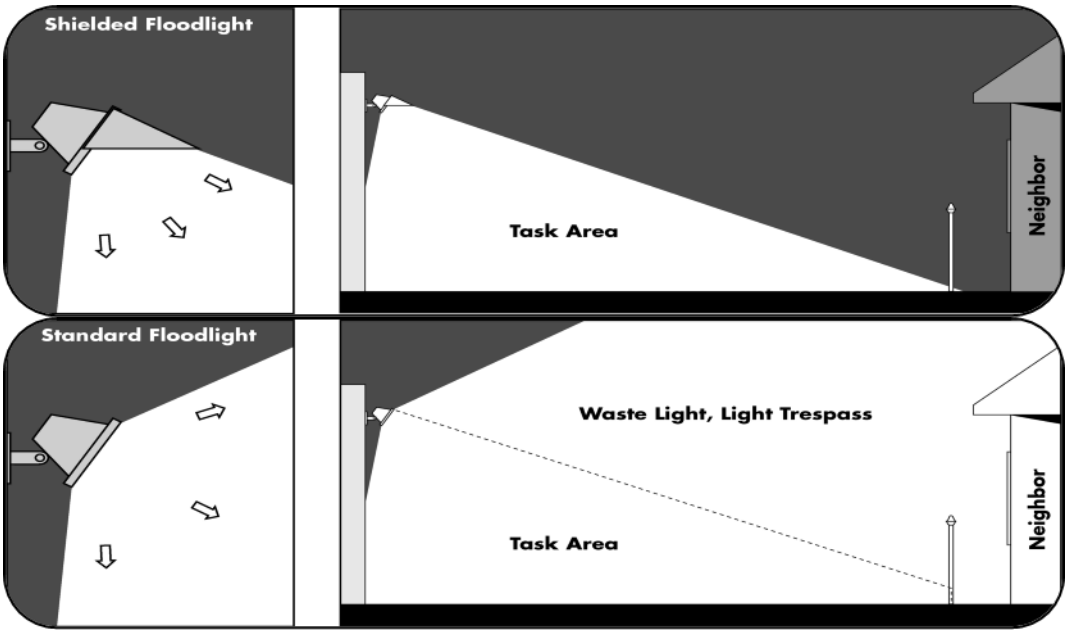

Figure 3: Before and after effects of shielding and light management designed to minimize light attraction risk to seabirds and to decrease light pollution. Source: www.darksky.org.

1.4. 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.

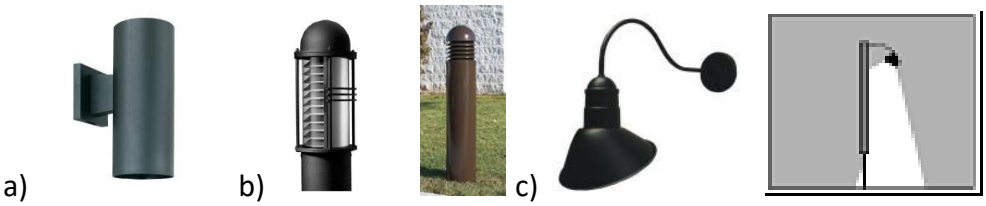

Figure 1-: (a) Wall mount cylinder down-light, (b) bollards with downward-directed louvers, and (c) sign lights angled downward. From http://myfwc.com/media/418417/SeaTurtle_LightingGuidelines.pdf (FWC 2011).

1.5. 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.

1.6. 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.

1.7. 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 (eg at sporting events), stadium lights should be turned off as soon as the public leaves the stadium.

1.8. 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.

1.9. 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.

1.10. 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.

1.11. 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.

1.12. 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.

1.13. 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

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

KAUAI SEABIRD HABITAT CONSERVATION PLAN

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
4272B Rice Street, Lihue HI 96766 - www.kauaiseabirdhcp.com
Photos courtesy of DLNR and Brenda Zaun USFWS

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

KAUAI SEABIRD HABITAT CONSERVATION PLAN

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
4272B Rice Street, Lihue HI 96766 www.kauaiseabirdhcp.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:
Budget Details

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).

Item	Year 1	Annual cost
Salaries	$170,000.00	$97,500
Subcontracted expenses	$31,200.00	$3,800
Capital costs	$228,440.00	$2,000
Materials	$78,361.00	$20,827
Training	$3,000.00	$3,000
Travel	$11,815.00	$11,815
Misc	$2,670.00	$2,670
Contingency	$14,910.24	
Subtotal	$540,396.24	$141,612
Overhead	$81,059.44	$21,242
Contractor Total	**$621,455.68**	**$162,854**
State	$10,000.00	$10,000
NFWF	$12,429.00	$3,355
Overall total	$643,884.68	

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.

SCENARIO	ITEM	ESTIMATED COST	SOURCE/NOTES	POTENTIALLY APPLICABLE YEAR
Fence delay	Increased cost to build fence	$42,426	Fence costs 25% more than expected	Year 1
Predators not eradicated in first attempt	Double effort (2X equipment)	$13,550		Year 1
TOTAL that may be needed in Year 1		**$55,976**		
Birds not attracted to site	Double speaker system & change soundtrack	$2,500		Year 3-4
	Install decoys	$4,000		Year 3-4
TOTAL that may be needed in Years 3-4		**$6,500**		
Birds not breeding at site	Replace all artificial burrows	$10,000		Years 4-7
TOTAL that may be needed in Years 4-7		**$10,000**		
SOS not available	Vet care for non-lethal take birds	$500/bird	Cost depends on Participant take	Any year
Natural disaster destroys fence	Fence and social attraction equipment replacement & repeat predator control (labor only)	$243,440	$213,440 + inflation + $15,000 + $15,000 X2 replacement threshold	Any year
Natural disaster requires vegetation restoration	Replanting, invasive plant control & erosion control	$25,000	Estimate from NTBG for plant survey and outplanting of native plants	Any year
Vandalism creates need for additional monitoring	Additional cameras and signage	$4,375	5 cameras & mounts; signs	Any year
No continuation of site beyond 30 year term	Fence decommissioning	$42,438	50% of original cost (labor)	Year 30
Barn Owl removal not successful	Additional shooting nights/alt equip/expert help	$15,000		Any year
Fence breach	Repeat of predator eradication (labor cost)	$15,000		Any year
Monitoring insufficient	Increase camera effort by 20%	$4,823		Any year
Total that may be needed in any year		**$350,076**		

Appendix H:
Applicant Participant Inclusion Plans

Kaua‘i Seabird Habitat Conservation Program (KSHCP)

Participant Inclusion Plan (PIP)

Name of Applicant/Participant

Alexander & Baldwin, Inc.

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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 Kukuiʻula Village LLC ABP Waipouli LLC KDC, LLC Kukuiʻula 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:
Address:

Email:
Telephone:

Alternate Contact: Name:
Address:

Telephone:
Email:

Preparer Contact:	Name:	Lisa A. Bail, Esq.
	Address:	Goodsill Anderson Quinn & Stifel LLP 999 Bishop St., Suite 1600 Honolulu, HI 96813
	Email:	lbail@goodsill.com
	Telephone:	(808) 547-5787
Preparer Contact:	Name:	Reginald David
	Address:	Rana Biological Consulting, Inc. P.O. Box 1371 Kailua-Kona, HI 96740
	Email:	davidr003@hawaii.rr.com
	Telephone:	(808) 937-0124

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.

	Property Name/Description	**Owner**	**TMK Number**	**Size**
a.	Port Allen Solar Farm (solar power array) McBryde Resources, Inc. operator	McBryde Sugar Company LLC	(4) 2-1-001:051	20 acres
b.	Port Allen Center I and II (commercial/warehouse facilities)	A & B Properties Hawaii, LLC	(4) 2-1-003:004	2.67 acres
c.	Port Allen south parcels	A & B Properties Hawaii, LLC	(4) 2-1-003:029 (BEI parcel) (4) 2-1-003:030 (shore parcel)	0.813 acres 1.283 acres
d.	Port Allen parking lots	Alexander & Baldwin LLC	(4) 2-1-003:025 (4) 2-1-003:026	0.6614 acres 1.2618 acres
e.	Port Allen Steel Warehouse (commercial/warehouse facilities)	A & B Properties Hawaii, LLC	(4) 2-1-003:028	3.598 acres
f.	Port Allen Marina Center (commercial/retail center)	A & B Properties Hawaii, LLC	(4) 2-1-003:040	1.71 acres
g.	Pump 3 Hanapepe Valley (irrigation pump station) McBryde Resources, Inc. operator	McBryde Sugar Company, LLC	(4) 2-1-001:010 (portion)	0.45 acres (of 123.0683 acres)
h.	Kalaheo Powerhouse (hydroelectric plant) McBryde Resources, Inc. operator	McBryde Sugar Company, LLC	(4) 2-4-016:013 portion	0.6 acres (of 48.064 acres)
i.	Wainiha Powerhouse (hydroelectric plant) McBryde Resources, Inc. operator	McBryde Sugar Company LLC	(4) 5-8-003:003 portion	1.5 acres (of 30.87 acres)

j.	Hokulei Shopping Village (shopping center)	ABP LR1 LLC ABP LR2 LLC ABP LR3 LLC	(4) 3-3-003:046, 049, 050, 051, 052, 053	14.598 acres
k.	The Shops at Kukuiʻula (retail center)	Kukuiʻula Village LLC	(4) 2-6-015:010	10.241 acres
l.	Waipouli Town Center, Kapaa (shopping center)	ABP Waipouli LLC	(4) 4-3-008:002	4.267 acres
m.	Kukuiʻula Development (Plantation Core/The Club)	KDC, LLC	(4) 2-6-019:031 (Plantation Core)	15.264 acres

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.

Port Allen Solar Farm

Table 1(a): Lighting at Port Allen Solar Farm

List of Buildings	Type/Description of Lights Present	Location	Purpose of the Lights	Describe any measures implemented to avoid or minimize take impacts to Covered Species
Control building	Fully shielded down pointed over door LED lights	Over two doors on the exterior of the building	Safety if an emergency occurs at night and service access is required	Both lights are fully dark sky compliant and lights are not illuminated except when a night time service call is required

Port Allen Solar Farm

Table 2(a): Green Sea Turtle Assessment for Port Allen Solar Farm

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.		
Are any of the facilities located adjacent to a beach?	Yes	**If yes, provide length of beach frontage & brief description of facilities & lights adjacent to the beach** 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).
Are any of the Covered Activities (lights) visible from a beach?	A&B's lights are not visible from the beach.	**If yes, describe the specific lights (type, , height, purpose) & specific location; provide map & photos showing distance from beach**
Have green sea turtles been known to nest on any beaches adjacent to the facilities?	No	**If yes, provide information about nesting occurrences, if known, including location and date and any other information**

Port Allen Center I and II

Table 1(b): Lighting at Port Allen Center I and II

List of Buildings	Type/Description of Lights Present	Location	Purpose of the Lights	Describe any measures implemented to avoid or minimize take impacts to Covered Species
Port Allen Center 1: One warehouse split into six bays, fronting Waialo Road, totaling 28,000 sq. ft.	12 flat LED panel lights	Mounted on steel building pointed down and shielded	Safety and security	A lighting audit was conducted of the property and most of the unshielded lighting was replaced with LED that are dark sky compliant
"	4 fully shielded cylinder lights	Mounted on steel building pointed down and shielded	Safety and security	A lighting audit was conducted of the property and most of the unshielded lighting was replaced with LED that are dark sky compliant
"	2 large fully shielded lights	On either side of the Brew Pub entrance	Safety and security	A lighting audit was conducted of the property and most of the unshielded lighting was replaced with LED that are dark sky compliant
"	Eight fixtures of various types which have been deactivated	Back side of the building	Not used anymore	These fixtures will either be replaced, modified to make them dark sky compliant, or deactivated.
Port Allen Center 2: One warehouse split into seven bays, totaling 13,198 sq. ft.	3 flat low wattage LED panels mounted so that they point straight down	On west facing wall overlooking the parking lot	Safety and security	A lighting audit was conducted of the property and most of the unshielded lighting was replaced with LED that are dark sky compliant
	1 bare bulb floods with two lights each	On west facing wall overlooking the parking lot	Safety and security, only used occasionally businesses are not open at night	These fixtures will either be replaced, modified to make them dark sky compliant, or deactivated.

	I motion triggered flat LED fixture	On west facing wall overlooking the parking lot	Safety and security	A lighting audit was conducted of the property and most of the unshielded lighting was replaced with LEDs that are dark sky compliant
	3 bare bulbs	One on the back of the building and two by NAPA	Safety and security, only used occasionally businesses are not open at night	These fixtures will be replaced or modified to make them dark sky compliant or will be deactivated

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.		
Are any of the facilities located adjacent to a beach?	No	**If yes, provide length of beach frontage & brief description of facilities & lights adjacent to the beach**
Are any of the Covered Activities (lights) visible from a beach?	No	**If yes, describe the specific lights (type, , height, purpose) & specific location; provide map & photos showing distance from beach**
Have green sea turtles been known to nest on any beaches adjacent to the facilities?	No	**If yes, provide information about nesting occurrences, if known, including location and date and any other information**

Port Allen South Parcels

Table 1(c): Lighting at Port Allen South Parcels

List of Buildings	Type/Description of Lights Present	Location	Purpose of the Lights	Describe any measures implemented to avoid or minimize take impacts to Covered Species
Vacant Shoreline Parcel - none	None	N/A	N/A	N/A
BEI Parcel – two buildings, plus a shipping container converted to a building	1 flat flood light	Mounted on power pole		Light is no longer functional
"	1 unshielded streetlight, deactivated	In yard		Light is no longer functional

Port Allen South Parcels

Table 2(c): Green Sea Turtle Assessment for Port Allen South Parcels

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.		
Are any of the facilities located adjacent to a beach? The vacant lot is adjacent to the shoreline but has no "facilities" other than a fuel pipeline operated by Island Energy Services The BEI lot is not adjacent to the shoreline	No	**If yes, provide length of beach frontage & brief description of facilities & lights adjacent to the beach** 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
Are any of the Covered Activities (lights) visible from a beach?	No	**If yes, describe the specific lights (type, , height, purpose) & specific location; provide map & photos showing distance from beach**
Have green sea turtles been known to nest on any beaches adjacent to the facilities?	No	**If yes, provide information about nesting occurrences, if known, including location and date and any other information**

Port Allen Parking Lots

Table 1(d): Lighting at Port Allen Parking Lots

List of Buildings	Type/Description of Lights Present	Location	Purpose of the Lights	Describe any measures implemented to avoid or minimize take impacts to Covered Species
None – unpaved parking lot located ocean side of the Marina Center	Three LED fully shielded streetlights	Fronting Aka Ula Road *makai* of the Marina Center	Safety and security	Selected fully shielded streetlights – there are regular streetlights along Waialo Road which are operated by KIUC

Port Allen Parking Lots

Table 2(d): Green Sea Turtle Assessment for Port Allen Parking Lots

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.		
Are any of the facilities located adjacent to a beach?	No (there is shoreline frontage, but no beach).	**If yes, provide length of beach frontage & brief description of facilities & 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.
Are any of the Covered Activities (lights) visible from a beach?	No	**If yes, describe the specific lights (type, , height, purpose) & specific location; provide map & photos showing distance from beach** A&B lighting is inland of the Navy and HDOT-DOT lighting
Have green sea turtles been known to nest on any beaches adjacent to the facilities?	No	**If yes, provide information about nesting occurrences, if known, including location and date and any other information**

Port Allen Steel Warehouse

Table 1(e): Lighting at Port Allen Steel Warehouse

List of Buildings	Type/Description of Lights Present	Location	Purpose of the Lights	Describe any measures implemented to avoid or minimize take impacts to Covered Species
One Steel warehouse building divided into seven bays totally 22,622 sq. ft.	Seven rectangular wall sconces with foil shield	Attached to the building sides	Safety and security	Most of these fixtures are no longer functional
"	Six motion sensor activated LED panels	Attached to the building sides	Safety and security	Lights turn on only when someone approaches the building and turn off when they leave
"	Four double bulb flood lights	Attached to building	Safety and security	These are no longer active
"	Two downward pointed floods triggered by motion sensors	Attached to building	Safety and security	Lights turn on only when someone approaches the building and turn off when they leave
"	Five other non-shielded fixtures	Attached to building	No longer in use	These fixtures have been deactivated, and will be removed

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.		
Are any of the facilities located adjacent to a beach?	No (there is shoreline frontage, but no beach)	**If yes, provide length of beach frontage & brief description of facilities & 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.
Are any of the Covered Activities (lights) visible from a beach?	No	**If yes, describe the specific lights (type, , height, purpose) & specific location; provide map & photos showing distance from beach**
Have green sea turtles been known to nest on any beaches adjacent to the facilities?	No	**If yes, provide information about nesting occurrences, if known, including location and date and any other information**

Port Allen Marina Center

Table 1(f): Lighting at Port Allen Marina Center

List of Buildings	Type/Description of Lights Present	Location	Purpose of the Lights	Describe any measures implemented to avoid or minimize take impacts to Covered Species
Two buildings connected by a courtyard	56 Low wattage wall sconces	Attached to the walls of the buildings under an overhang	Security and safety	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.
"	Ten fully shielded down pointing streetlights	Located in the parking lots and along the front of the shopping center	Security and safety	
"	Eight fluorescent signage illuminators, completely shielded by metal shielding	On the front of the building lighting individual store signs	Illuminate shop signs	
"	Two CFL floods	Pointed at the entrance to the bar. Under the eaves of the building	Illuminate bar entrance	

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.		
Are any of the facilities located adjacent to a beach?	No	**If yes, provide length of beach frontage & brief description of facilities & lights adjacent to the beach**
Are any of the Covered Activities (lights) visible from a beach?	No	**If yes, describe the specific lights (type, , height, purpose) & specific location; provide map & photos showing distance from beach**
Have green sea turtles been known to nest on any beaches adjacent to the facilities?	No	**If yes, provide information about nesting occurrences, if known, including location and date and any other information**

Pump 3 Hanapepe Valley

Table 1(g): Lighting at Pump 3 Hanapepe Valley

List of Buildings	Type/Description of Lights Present	Location	Purpose of the Lights	Describe any measures implemented to avoid or minimize take impacts to Covered Species
Control building	One deactivated light	Over door into the control building	Nighttime emergency service calls	These lights are no longer functional.
Pump shed	Two unshielded flood lights	Lighting the pumps	Nighttime emergency service calls	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.
Switching yard	None			

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.		
Are any of the facilities located adjacent to a beach?	No	**If yes, provide length of beach frontage & brief description of facilities & lights adjacent to the beach**
Are any of the Covered Activities (lights) visible from a beach?	No	**If yes, describe the specific lights (type, , height, purpose) & specific location; provide map & photos showing distance from beach**
Have green sea turtles been known to nest on any beaches adjacent to the facilities?	No	**If yes, provide information about nesting occurrences, if known, including location and date and any other information**

Kalaheo Powerhouse

Table 1(h): Lighting at Kalaheo Powerhouse

List of Buildings	Type/Description of Lights Present	Location	Purpose of the Lights	Describe any measures implemented to avoid or minimize take impacts to Covered Species
Powerhouse	One three bulb fixture completely shielded	On powerhouse walls	Repairs at night	These lights are not usually turned on
"	One downward pointed circular low wattage LED fixture	This fixture is under the eaves and is not visible from the sky	Repairs at night	
"	Two small wall sconces – no longer active			

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.		
Are any of the facilities located adjacent to a beach?	No	**If yes, provide length of beach frontage & brief description of facilities & lights adjacent to the beach**
Are any of the Covered Activities (lights) visible from a beach?	No	**If yes, describe the specific lights (type, , height, purpose) & specific location; provide map & photos showing distance from beach**
Have green sea turtles been known to nest on any beaches adjacent to the facilities?	No	**If yes, provide information about nesting occurrences, if known, including location and date and any other information**

Wainiha Powerhouse

Table 1(i): Lighting at Wainiha Powerhouse

List of Buildings	Type/Description of Lights Present	Location	Purpose of the Lights	Describe any measures implemented to avoid or minimize take impacts to Covered Species
Powerhouse	Three small full cutoff fixtures	Attached to the powerhouse walls	Emergency nighttime repairs	These lights are not turned on except in the case of nighttime emergencies
Substation	None			

Wainiha Powerhouse

Table 2(i): Green Sea Turtle Assessment for Wainiha 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.		
Are any of the facilities located adjacent to a beach?	No	**If yes, provide length of beach frontage & brief description of facilities & lights adjacent to the beach**
Are any of the Covered Activities (lights) visible from a beach?	No	**If yes, describe the specific lights (type, , height, purpose) & specific location; provide map & photos showing distance from beach**
Have green sea turtles been known to nest on any beaches adjacent to the facilities?	No	**If yes, provide information about nesting occurrences, if known, including location and date and any other information**

Hokulei Shopping Village

Table 1(j): Lighting at Hokulei Shopping Village

List of Buildings	Type/Description of Lights Present	Location	Purpose of the Lights	Describe any measures implemented to avoid or minimize take impacts to Covered Species
The shopping center contains 10 buildings (please see site plan in Appendix A).	101 full cutoff low wattage streetlights, three configurations	Within the parking lot	Security and customer safety	All lights are dark sky compliant and use low wattage LED luminaires
	111 bucket wall lights, low wattage LEDs	Mounted on the store walls	Security and customer safety	All lights are dark sky compliant and use low wattage LED bulbs
	94 cylindrical tube lights – low wattage LEDs	Mounted on the store walls	Security and customer safety	All lights are dark sky compliant, use low wattage LED bulbs, and can't be seen from the sky
	30 recessed can lights, low wattage LEDs	Mounted in the ceilings along the covered walkways	Security and customer safety	All lights are dark sky compliant, use low wattage LED bulbs, and can't be seen from the sky
	26 tube lights, two configurations	Mounted under awnings around the shopping center	Security and customer safety	All lights are dark sky compliant, use low wattage LED bulbs, and can't be seen from the sky
	1 large ceiling mounted flat panel LED	Mounted in the ceiling above a covered walkway	Security and customer safety	All lights are dark sky compliant, use low wattage LED bulbs, and can't be seen from the sky

	2 cylindrical UFO LED lights	Mounted on the exterior walls of the Jack in the Box	Security and customer safety	All lights are dark sky compliant, use low wattage LED bulbs, and can't be seen from the sky
	2 can flood lights	Mounted on the exterior walls of the Wendy's	Security and customer safety	All lights are dark sky compliant, use low wattage LED bulbs, and can't be seen from the sky
	4 emergency exit box lights, CFL bulbs	Mounted above the emergency exit doors on the Petco Store	Emergency exit illumination	These lights only turn on when the power is interrupted and the stores are open
	10 in ceiling CFL panels	Mounted in the ceiling above the gas pumps in the Chevron Station	Security and customer safety	
	7 wall mounted shielded can LED lights	Mounted on the exterior walls of American Savings	Security and customer safety	All lights are dark sky compliant and use low wattage LED bulbs
	9 wall mounted tulip LED can lights	Mounted on the exterior walls of American Savings	Security and customer safety	All lights are dark sky compliant and use low wattage LED bulbs

	16 LED wall mounted shielded LED box lights	Mounted on the exterior walls of American Savings	Security and customer safety	All lights are dark sky compliant and use low wattage LED bulbs
	1 LED fully shielded box light	Mounted beneath an awning at the drive through of American Savings	Security and customer safety	All lights are dark sky compliant and use low wattage LED bulbs
	5 fully shielded LED Bollard lights	Installed along the eastern entrance road to the shopping Center	Security and customer safety	All lights are dark sky compliant and use low wattage LED bulbs
	23 flat fully shielded LED panel lights	Mounted on the exterior walls of the Safeway Store	Security and customer safety	All lights are dark sky compliant, use low wattage LED bulbs, and can't be seen from the sky
	4 ceiling mounted can lights	Mounted on the ceiling of the entrance to the Safeway Store	Security and customer safety	All lights are dark sky compliant, use low wattage LED bulbs, and can't be seen from the sky
	5 in wall LED safety lights	Mounted in the walls of the Safeway loading dock	Security and employee safety	

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.		
Are any of the facilities located adjacent to a beach?	No	**If yes, provide length of beach frontage & brief description of facilities & lights adjacent to the beach**
Are any of the Covered Activities (lights) visible from a beach?	No	**If yes, describe the specific lights (type, , height, purpose) & specific location; provide map & photos showing distance from beach**
Have green sea turtles been known to nest on any beaches adjacent to the facilities?	No	**If yes, provide information about nesting occurrences, if known, including location and date and any other information**

The Shops at Kukuiʻula

Table 1(k): Lighting at The Shops at Kukuiʻula

List of Buildings	Type/Description of Lights Present	Location	Purpose of the Lights	Describe any measures implemented to avoid or minimize take impacts to Covered Species
Shopping Center	67 LED streetlights full cutoff, pointed parallel to the ground	Parking lot	Safety and security	
"	6 flat panel LED parking lot lights	Employee Parking Lot	Safety and security	
"	Numerous lights with wide range of designs and wattages illuminating the shops	On and around the shops	Safety and security	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

The Shops at Kukuiʻula

Table 2(k): Green Sea Turtle Assessment for The Shops at Kukuiʻula

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.		
Are any of the facilities located adjacent to a beach?	No	**If yes, provide length of beach frontage & brief description of facilities & lights adjacent to the beach**
Are any of the Covered Activities (lights) visible from a beach?	No	**If yes, describe the specific lights (type, , height, purpose) & specific location; provide map & photos showing distance from beach**
Have green sea turtles been known to nest on any beaches adjacent to the facilities?	No	**If yes, provide information about nesting occurrences, if known, including location and date and any other information**

Waipouli Town Center

Table 1(l): Lighting at Waipouli Town Center

List of Buildings	Type/Description of Lights Present	Location	Purpose of the Lights	Describe any measures implemented to avoid or minimize take impacts to Covered Species
Shopping Center and a separate McDonalds building	Twenty-five full cutoff shielded parking lot streetlights in various configurations	In the parking lot	Safety and security	Full cutoff fixtures
	Thirteen wall pack LED fixtures	Attached to the outside walls of the shopping center	Safety and security	Full cutoff fixtures
	Two flat panel full cutoff LED wall packs	Attached to the outside walls of the shopping center in the loading dock area	Safety and security	Full cutoff fixtures
	Two, two light bulb flood light fixtures, motion sensor triggered	Back wall of the shopping center	Safety and security	Motion triggered, not usually on

	Thirty-one fully shielded low wattage LED ceiling fixtures	Mounted to the ceilings above the covered walkways – not visible from the sky	Safety and security	Full cutoff fixtures, not visible from the sky
	One floodlight under roof	Flood light under roof pointed at the cashier station of the McDonalds restaurant	Safety and security	Masked by roof overhang

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.		
Are any of the facilities located adjacent to a beach?	No	**If yes, provide length of beach frontage & brief description of facilities & lights adjacent to the beach**
Are any of the Covered Activities (lights) visible from a beach?	No	**If yes, describe the specific lights (type, , height, purpose) & specific location; provide map & photos showing distance from beach**
Have green sea turtles been known to nest on any beaches adjacent to the facilities?	No	**If yes, provide information about nesting occurrences, if known, including location and date and any other information**

Kukuiʻula Development (Plantation Core/The Club)

Table 1(m): Lighting at Kukuiʻula Development (Plantation Core/The Club)

List of Buildings	Type/Description of Lights Present	Location	Purpose of the Lights	Describe any measures implemented to avoid or minimize take impacts to Covered Species
Parking Lots	3 walkway "mushroom" lights which are completely shielded and have low wattage LEDs	Along walkways	Path lighting and safety and security	Completely shielded low wattage dark sky LED fixtures
"	79 tree-mounted fully shielded pencil can lights	In trees (lights are downward pointed in parking lot)	Parking lot safety and security	Completely shielded low wattage dark sky LED fixtures
Cart Barn and Mechanicals Building	15 low wattage CFL bulb lights in glass fixtures	Mounted on the walls	Safety and security	Low wattage CFLs
"	2 flood lights with CFL bulbs	Mounted at the loading dock bay	Deliveries and service at night	Under eves, downward pointed and only turned on when needed
Porte Cochere	2 walkway "mushroom" lights which are completely shielded, low wattage LEDs	Along walkways	Path lighting and safety and security	Completely shielded low wattage dark sky LED fixtures
"	8 gas candle lanterns	Along driveway and framing the entrance	Accent and mood	Very dim gas lanterns

"	8 tree mounted fully shielded pencil can lights	In trees downward pointed in trees	Accent and mood lighting	Completely shielded low wattage dark sky LED fixtures
Kukui‘ula Realty	4 wall-mounted lantern lights with milk glass domes, shielded from above	Mounted on entrance wall	Safety and security	Low wattage, shielded from above and under eves of the building
The Lodge	4 panel LED lights	West side exterior wall	Safety and security	Low wattage LEDs, all other lights are interior lights or completely shielded by the building
The Club	17 oil lamp style low wattage lamps in brass fixture	Exterior walls	Safety and security	Low wattage, shielded from above, under eves, most under eves
"	4 wall-mounted lantern lights in milk glass domes, shielded from above	Mounted on entrance wall	Safety and security	Low wattage, shielded from above and under eves of the building
"	9 gas candle lanterns	Exterior	Accent and mood	Very dim gas lanterns
"	10 wall-mounted lantern lights in milk glass domes, shielded from above	Mounted on buildings	Safety and security	Low wattage, shielded from above and most under eves of the buildings

"	16 square “ship” lantern fixtures, LED frosted glass	Mounted on buildings	Safety and security	Low wattage, shielded from above and under eves of the buildings
Pool area structures	8 wall-mounted lantern lights in milk glass domes, shielded from above	Mounted on buildings	Safety and security	Low wattage, shielded from above and most under eves of the buildings
"	2 white glass lanterns, shielded from above	Mounted on buildings	Safety and security	Low wattage, shielded from above and under eves of the buildings
"	51 white pencil cylinder can lights, LED	Mounted inside the cabanas on the underside of the roof pointed at the ground	Safety and security and mood lighting	Low wattage, dark sky compliant, shielded completely under roof in the cabanas, not visible from above
"	The pool is lit with low wattage 38 watt LED fixtures	Mounted on the pool floor and walls	Safety and security	
Landscaping	61 walkway “mushroom” lights which are completely shielded and have low wattage LEDs	Along walkways	Path lighting and safety and security	Completely shielded low wattage dark sky LED fixtures
"	36 tree-mounted fully shielded pencil can lights	In trees, downward pointed in the ground	Safety and security and mood lighting	Completely shielded low wattage dark sky LED fixtures

"	20 in-wall, fully shielded, 20 watt step lights, shielded, low wattage	Mounted in the rock sides of the exterior stairs	Safety and security and mood lighting	Completely shielded low wattage dark sky LED fixtures

Kukuiʻula Development (Plantation Core/The Club)

Table 2(m): Green Sea Turtle Assessment for Kukuiʻula 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.		
Are any of the facilities located adjacent to a beach?	No	**If yes, provide length of beach frontage & brief description of facilities & lights adjacent to the beach**
Are any of the Covered Activities (lights) visible from a beach?	No	**If yes, describe the specific lights (type, , height, purpose) & specific location; provide map & photos showing distance from beach**
Have green sea turtles been known to nest on any beaches adjacent to the facilities?	No	**If yes, provide information about nesting occurrences, if known, including location and date and any other information**

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 Kukuiʻula
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.

Kukuiʻula Development (Plantation Core/The Club)
At the present time, Kukuiʻula 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.

Port Allen Solar Farm

Table 3(a): Light Attraction Alternatives to the Taking at Port Allen Solar Farm

Artificial Light Attraction Alternatives to the Taking Considered	Reasons Alternatives are not Being Utilized (provide justification)
▪ **Deactivate all outdoor artificial lights from dusk to dawn during the fledgling fall-out season September 15 to December 15**	Lights are not turned on except when a nighttime emergency requires maintenance
▪ **Change operations to eliminate the need for outdoor artificial lighting (e.g., from nighttime to daylight hours)**	N/A
▪ **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)**	N/A
▪ **Other alternatives to the taking considered, if any. If facility is proposed, include alternative designs considered**	N/A

Port Allen Center I and II

Table 3(b): Light Attraction Alternatives to the Taking at Port Allen Center I and II

Artificial Light Attraction Alternatives to the Taking Considered	Reasons Alternatives are not Being Utilized (provide justification)
▪ **Deactivate all outdoor artificial lights from dusk to dawn during the fledgling fall-out season September 15 to December 15**	Lighting at both of these facilities is minimal. Safety and security preclude completely turning off all lights at night
▪ **Change operations to eliminate the need for outdoor artificial lighting (e.g., from nighttime to daylight hours)**	Not practicable
▪ **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)**	N/A
▪ **Other alternatives to the taking considered, if any. If facility is proposed, include alternative designs considered**	

Port Allen South Parcels

Table 3(c): Light Attraction Alternatives to the Taking at Port Allen South Parcels

Artificial Light Attraction Alternatives to the Taking Considered	Reasons Alternatives are not Being Utilized (provide justification)
▪ **Deactivate all outdoor artificial lights from dusk to dawn during the fledgling fall-out season September 15 to December 15**	Completed
▪ **Change operations to eliminate the need for outdoor artificial lighting (e.g., from nighttime to daylight hours)**	N/A
▪ **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)**	All streetlights are full cutoff dark sky compliant fixtures.
▪ **Other alternatives to the taking considered, if any. If facility is proposed, include alternative designs considered**	N/A

Port Allen Parking Lots

Table 3(d): Light Attraction Alternatives to the Taking at Port Allen Parking Lots

Artificial Light Attraction Alternatives to the Taking Considered	Reasons Alternatives are not Being Utilized (provide justification)
▪ **Deactivate all outdoor artificial lights from dusk to dawn during the fledgling fall-out season September 15 to December 15**	Safety and security preclude completely turning off all streetlights at night
▪ **Change operations to eliminate the need for outdoor artificial lighting (e.g., from nighttime to daylight hours)**	N/A
▪ **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)**	The parking lot lights are shielded
▪ **Other alternatives to the taking considered, if any. If facility is proposed, include alternative designs considered**	

Port Allen Steel Warehouse

Table 3(e): Light Attraction Alternatives to the Taking at Port Allen Steel Warehouse

Artificial Light Attraction Alternatives to the Taking Considered	Reasons Alternatives are not Being Utilized (provide justification)
▪ **Deactivate all outdoor artificial lights from dusk to dawn during the fledgling fall-out season September 15 to December 15**	Has been completed
▪ **Change operations to eliminate the need for outdoor artificial lighting (e.g., from nighttime to daylight hours)**	See above
▪ **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)**	N/A
▪ **Other alternatives to the taking considered, if any. If facility is proposed, include alternative designs considered**	N/A

Port Allen Marina Center

Table 3(f): Light Attraction Alternatives to the Taking at Port Allen Marina Center

Artificial Light Attraction Alternatives to the Taking Considered	Reasons Alternatives are not Being Utilized (provide justification)
▪ **Deactivate all outdoor artificial lights from dusk to dawn during the fledgling fall-out season September 15 to December 15**	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&B is in the process of lowering the wattage of the bulbs in the wall sconces.
▪ **Change operations to eliminate the need for outdoor artificial lighting (e.g., from nighttime to daylight hours)**	Not practicable. Safety and security preclude completely turning off all lights at night
▪ **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)**	N/A
▪ **Other alternatives to the taking considered, if any. If facility is proposed, include alternative designs considered**	Modification and/or replacement of wall sconce lighting is being evaluated

Pump 3 Hanapepe Valley

Table 3(g): Light Attraction Alternatives to the Taking at Pump 3 Hanapepe Valley

Artificial Light Attraction Alternatives to the Taking Considered	Reasons Alternatives are not Being Utilized (provide justification)
▪ **Deactivate all outdoor artificial lights from dusk to dawn during the fledgling fall-out season September 15 to December 15**	Completed
▪ **Change operations to eliminate the need for outdoor artificial lighting (e.g., from nighttime to daylight hours)**	N/A
▪ **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)**	N/A
▪ **Other alternatives to the taking considered, if any. If facility is proposed, include alternative designs considered**	N/A

Kalaheo Powerhouse

Table 3(h): Light Attraction Alternatives to the Taking at Kalaheo Powerhouse

Artificial Light Attraction Alternatives to the Taking Considered	Reasons Alternatives are not Being Utilized (provide justification)
▪ **Deactivate all outdoor artificial lights from dusk to dawn during the fledgling fall-out season September 15 to December 15**	Completed
▪ **Change operations to eliminate the need for outdoor artificial lighting (e.g., from nighttime to daylight hours)**	N/A
▪ **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)**	N/A
▪ **Other alternatives to the taking considered, if any. If facility is proposed, include alternative designs considered**	N/A

Wainiha Powerhouse

Table 3(i): Light Attraction Alternatives to the Taking at Wainiha Powerhouse

Artificial Light Attraction Alternatives to the Taking Considered	Reasons Alternatives are not Being Utilized (provide justification)
▪ **Deactivate <u>all</u> outdoor artificial lights from dusk to dawn during the fledgling fall-out season September 15 to December 15**	Completed
▪ **Change operations to eliminate the need for outdoor artificial lighting (e.g., from nighttime to daylight hours)**	N/A
▪ **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)**	N/A
▪ **Other alternatives to the taking considered, if any. If facility is proposed, include alternative designs considered**	N/A

Hokulei Shopping Village

Table 3(j): Light Attraction Alternatives to the Taking at Hokulei Shopping Village

Artificial Light Attraction Alternatives to the Taking Considered	Reasons Alternatives are not Being Utilized (provide justification)
▪ **Deactivate all outdoor artificial lights from dusk to dawn during the fledgling fall-out season September 15 to December 15**	Safety and security preclude completely turning off all lights at night
▪ **Change operations to eliminate the need for outdoor artificial lighting (e.g., from nighttime to daylight hours)**	Safety and security preclude completely turning off all lights at night
▪ **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)**	N/A
▪ **Other alternatives to the taking considered, if any. If facility is proposed, include alternative designs considered**	N/A

The Shops at Kukuiʻula

Table 3(k): Light Attraction Alternatives to the Taking at The Shops at Kukuiʻula

Artificial Light Attraction Alternatives to the Taking Considered	Reasons Alternatives are not Being Utilized (provide justification)
▪ **Deactivate all outdoor artificial lights from dusk to dawn during the fledgling fall-out season September 15 to December 15**	Safety and security preclude completely turning off all lights at night
▪ **Change operations to eliminate the need for outdoor artificial lighting (e.g., from nighttime to daylight hours)**	Safety and security preclude completely turning off all lights at night
▪ **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)**	N/A
▪ **Other alternatives to the taking considered, if any. If facility is proposed, include alternative designs considered**	A&B is currently working on re-designing the lighting at the shopping Center to reduce light attraction

Waipouli Town Center

Table 3(l): Light Attraction Alternatives to the Taking at Waipouli Town Center

Artificial Light Attraction Alternatives to the Taking Considered	Reasons Alternatives are not Being Utilized (provide justification)
▪ **Deactivate all outdoor artificial lights from dusk to dawn during the fledgling fall-out season September 15 to December 15**	Safety and security preclude completely turning off all lights at night
▪ **Change operations to eliminate the need for outdoor artificial lighting (e.g., from nighttime to daylight hours)**	Safety and security preclude completely turning off all lights at night
▪ **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)**	N/A
▪ **Other alternatives to the taking considered, if any. If facility is proposed, include alternative designs considered**	N/A

Kukuiʻula Development - Plantation Core/The Club

Table 3(m): Light Attraction Alternatives to the Taking at Kukuiʻula Development - Plantation Core/The Club

Artificial Light Attraction Alternatives to the Taking Considered	Reasons Alternatives are not Being Utilized (provide justification)
▪ **Deactivate all outdoor artificial lights from dusk to dawn during the fledgling fall-out season September 15 to December 15**	Safety and security preclude completely turning off all lights at night
▪ **Change operations to eliminate the need for outdoor artificial lighting (e.g., from nighttime to daylight hours)**	Safety and security preclude completely turning off all lights at night
▪ **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)**	N/A
▪ **Other alternatives to the taking considered, if any. If facility is proposed, include alternative designs considered**	N/A

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.

Port Allen Solar Farm

Table 4(a): Seabird Light Attraction Minimization Measures Considered at Port Allen Solar Farm

Minimization Measures Considered	Feasible? (Y / N)	If not Feasible to Implement Measures, Provide Reason
▪ **Change time of light use (lights off earlier)**	**Yes / No**	Currently the two over door lights are not turned on unless there is an emergency
▪ **Deactivate unnecessary lights**	**Yes / No**	This is a relatively new facility and there are no extraneous lighting fixtures
▪ **Replace all outdoor lights with full cut-off fixtures**	**Yes / No**	
▪ **Shield all outdoor lights with full cut-off shields**	**Yes / No**	
▪ **Angle all lights downward**	**Yes / No**	
▪ **Lower intensity (lumens) of outdoor lights**	**Yes / No**	
▪ **Change bulb color to non-white spectrum**	**Yes / No**	
▪ **Prohibit/control unleashed predatory animals; prohibit outdoor feeding of animals; require sealed rubbish containers**	**Yes / No**	
▪ **Provide Worker Seabird Awareness Training to staff**	**Yes / No**	
▪ **Provide outreach materials to staff & guests**	**Yes / No**	Not applicable – this is a power generation facility and there are no guests
▪ **Host Save Our Shearwaters (SOS) Aid Station**	**Yes / No**	There is an SOS Aid Station close by next to the Island Energy Services Fuel Tank Farm

Port Allen Center I and II

Table 4(b): Seabird Light Attraction Minimization Measures Considered at Port Allen Center I and II

Minimization Measures Considered	Feasible? (Y / N)	If not Feasible to Implement Measures, Provide Reason
▪ **Change time of light use (lights off earlier)**	**Yes / No**	
▪ **Deactivate unnecessary lights**	**Yes / No**	Numerous older light fixtures have been deactivated or replaced with new fixtures in the past five years
▪ **Replace all outdoor lights with full cut-off fixtures**	**Yes / No**	
▪ **Shield all outdoor lights with full cut-off shields**	**Yes / No**	
▪ **Angle all lights downward**	**Yes / No**	
▪ **Lower intensity (lumens) of outdoor lights**	**Yes / No**	All new lighting fixtures are low wattage LEDs
▪ **Change bulb color to non-white spectrum**	**Yes / No**	
▪ **Prohibit/control unleashed predatory animals; prohibit outdoor feeding of animals; require sealed rubbish containers**	**Yes / No**	
▪ **Provide Worker Seabird Awareness Training to staff**	**Yes / No**	
▪ **Provide outreach materials to staff & guests**	**Yes / No**	
▪ **Host Save Our Shearwaters (SOS) Aid Station**	**Yes / No**	There is an SOS Aid Station close by next to the Island Energy Services Fuel Tank Farm

Port Allen South Parcels

Table 4(c): Seabird Light Attraction Minimization Measures Considered at Port Allen South Parcels

Minimization Measures Considered	Feasible? (Y / N)	If not Feasible to Implement Measures, Provide Reason
▪ **Change time of light use (lights off earlier)**	**Yes / <u>No</u>**	There are no lights on either of these parcels
▪ **Deactivate unnecessary lights**	**<u>Yes</u> / No**	Complete
▪ **Replace all outdoor lights with full cut-off fixtures**	**Yes / <u>No</u>**	There are no lights on either of these parcels
▪ **Shield all outdoor lights with full cut-off shields**	**Yes / <u>No</u>**	There are no lights on either of these parcels
▪ **Angle all lights downward**	**Yes / <u>No</u>**	There are no lights on either of these parcels
▪ **Lower intensity (lumens) of outdoor lights**	**Yes / <u>No</u>**	There are no lights on either of these parcels
▪ **Change bulb color to non-white spectrum**	**Yes / <u>No</u>**	There are no lights on either of these parcels
▪ **Prohibit/control unleashed predatory animals; prohibit outdoor feeding of animals; require sealed rubbish containers**	**<u>Yes</u> / No**	
▪ **Provide Worker Seabird Awareness Training to staff**	**<u>Yes</u> / <u>No</u>**	A&B has no workers on the vacant lot or the BEI parcel, but A&B will provide seabird awareness training to its property management staff.
▪ **Provide outreach materials to staff & guests**	**<u>Yes</u> / <u>No</u>**	
▪ **Host Save Our Shearwaters (SOS) Aid Station**	**Yes / <u>No</u>**	There is an SOS Aid Station close by next to the Island Energy Services Fuel Tank Farm

Port Allen Parking Lots

Table 4(d): Seabird Light Attraction Minimization Measures Considered at Port Allen Parking Lots

Minimization Measures Considered	Feasible? (Y / N)	If not Feasible to Implement Measures, Provide Reason
▪ **Change time of light use (lights off earlier)**	**Yes / <u>No</u>**	For safety and security reasons, lighting is needed in the parking lot
▪ **Deactivate unnecessary lights**	**<u>Yes</u> / No**	
▪ **Replace all outdoor lights with full cut-off fixtures**	**<u>Yes</u> / No**	
▪ **Shield all outdoor lights with full cut-off shields**	**<u>Yes</u> / No**	
▪ **Angle all lights downward**	**<u>Yes</u> / No**	
▪ **Lower intensity (lumens) of outdoor lights**	**<u>Yes</u> / No**	
▪ **Change bulb color to non-white spectrum**	**<u>Yes</u> / No**	
▪ **Prohibit/control unleashed predatory animals; prohibit outdoor feeding of animals; require sealed rubbish containers**	**<u>Yes</u> / No**	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.
▪ **Provide Worker Seabird Awareness Training to staff**	**<u>Yes</u> / No**	
▪ **Provide outreach materials to staff & guests**	**<u>Yes</u> / No**	
▪ **Host Save Our Shearwaters (SOS) Aid Station**	**Yes / <u>No</u>**	There is an SOS Aid Station close by next to the Island Energy Services Fuel Tank Farm

Port Allen Steel Warehouse

Table 4(e): Seabird Light Attraction Minimization Measures Considered at Port Allen Steel Warehouse

Minimization Measures Considered	Feasible? (Y / N)	If not Feasible to Implement Measures, Provide Reason
▪ **Change time of light use (lights off earlier)**	**Yes / No**	Exterior lighting is motion activated so it is usually dark at night
▪ **Deactivate unnecessary lights**	**Yes / No**	
▪ **Replace all outdoor lights with full cut-off fixtures**	**Yes / No**	
▪ **Shield all outdoor lights with full cut-off shields**	**Yes / No**	
▪ **Angle all lights downward**	**Yes / No**	
▪ **Lower intensity (lumens) of outdoor lights**	**Yes / No**	
▪ **Change bulb color to non-white spectrum**	**Yes / No**	
▪ **Prohibit/control unleashed predatory animals; prohibit outdoor feeding of animals; require sealed rubbish containers**	**Yes / No**	Due to high crime, one tenant maintains watchdogs within his fenced yard
▪ **Provide Worker Seabird Awareness Training to staff**	**Yes / No**	
▪ **Provide outreach materials to staff & guests**	**Yes / No**	
▪ **Host Save Our Shearwaters (SOS) Aid Station**	**Yes / No**	There is an SOS Aid Station close by next to the Island Energy Services Fuel Tank Farm

Port Allen Marina Center

Table 4(f): Seabird Light Attraction Minimization Measures Considered at Port Allen Marina Center

Minimization Measures Considered	Feasible? (Y / N)	If not Feasible to Implement Measures, Provide Reason
▪ **Change time of light use (lights off earlier)**	**Yes / No**	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.
▪ **Deactivate unnecessary lights**	**Yes / No**	
▪ **Replace all outdoor lights with full cut-off fixtures**	**Yes / No**	
▪ **Shield all outdoor lights with full cut-off shields**	**Yes / No**	
▪ **Angle all lights downward**	**Yes / No**	
▪ **Lower intensity (lumens) of outdoor lights**	**Yes / No**	
▪ **Change bulb color to non-white spectrum**	**Yes / No**	
▪ **Prohibit/control unleashed predatory animals; prohibit outdoor feeding of animals; require sealed rubbish containers**	**Yes / No**	
▪ **Provide Worker Seabird Awareness Training to staff**	**Yes / No**	
▪ **Provide outreach materials to staff & guests**	**Yes / No**	
▪ **Host Save Our Shearwaters (SOS) Aid Station**	**Yes / No**	There is an SOS Aid Station close by next to the Island Energy Services Fuel Tank Farm

Pump 3 Hanapepe Valley

Table 4(g): Seabird Light Attraction Minimization Measures Considered at Pump 3 Hanapepe Valley

Minimization Measures Considered	Feasible? (Y / N)	If not Feasible to Implement Measures, Provide Reason
▪ **Change time of light use (lights off earlier)**	**Yes / No**	Lights are not turned on unless emergency nighttime repairs are required
▪ **Deactivate unnecessary lights**	**Yes / No**	
▪ **Replace all outdoor lights with full cut-off fixtures**	**Yes / No**	
▪ **Shield all outdoor lights with full cut-off shields**	**Yes / No**	
▪ **Angle all lights downward**	**Yes / No**	
▪ **Lower intensity (lumens) of outdoor lights**	**Yes / No**	
▪ **Change bulb color to non-white spectrum**	**Yes / No**	
▪ **Prohibit/control unleashed predatory animals; prohibit outdoor feeding of animals; require sealed rubbish containers**	**Yes / No**	Predatory animal control is not feasible outside of the fenced portion of the facility as this is a rural area
▪ **Provide Worker Seabird Awareness Training to staff**	**Yes / No**	
▪ **Provide outreach materials to staff & guests**	**Yes / No**	
▪ **Host Save Our Shearwaters (SOS) Aid Station**	**Yes / No**	This area is too isolated to warrant an aid station, and no downed seabirds have ever been recovered from this site.

Kalaheo Powerhouse

Table 4(h): Seabird Light Attraction Minimization Measures Considered at Kalaheo Powerhouse

Minimization Measures Considered	Feasible? (Y / N)	If not Feasible to Implement Measures, Provide Reason
▪ **Change time of light use (lights off earlier)**	**Yes / No**	Lights are not turned on unless emergency nighttime repairs are required
▪ **Deactivate unnecessary lights**	**Yes / No**	
▪ **Replace all outdoor lights with full cut-off fixtures**	**Yes / No**	
▪ **Shield all outdoor lights with full cut-off shields**	**Yes / No**	
▪ **Angle all lights downward**	**Yes / No**	
▪ **Lower intensity (lumens) of outdoor lights**	**Yes / No**	
▪ **Change bulb color to non-white spectrum**	**Yes / No**	
▪ **Prohibit/control unleashed predatory animals; prohibit outdoor feeding of animals; require sealed rubbish containers**	**Yes / No**	Predator control is not feasible outside the fenced portion of the facility due to the rural area
▪ **Provide Worker Seabird Awareness Training to staff**	**Yes / No**	
▪ **Provide outreach materials to staff & guests**	**Yes / No**	
▪ **Host Save Our Shearwaters (SOS) Aid Station**	**Yes / No**	This area is too isolated to warrant an aid station, and no downed seabirds have ever been recovered from this site.

Wainiha Powerhouse

Table 4(i): Seabird Light Attraction Minimization Measures Considered at Wainiha Powerhouse

Minimization Measures Considered	Feasible? (Y / N)	If not Feasible to Implement Measures, Provide Reason
▪ **Change time of light use (lights off earlier)**	**Yes / No**	Lights are not turned on unless emergency nighttime repairs are required
▪ **Deactivate unnecessary lights**	**Yes / No**	
▪ **Replace all outdoor lights with full cut-off fixtures**	**Yes / No**	
▪ **Shield all outdoor lights with full cut-off shields**	**Yes / No**	
▪ **Angle all lights downward**	**Yes / No**	
▪ **Lower intensity (lumens) of outdoor lights**	**Yes / No**	
▪ **Change bulb color to non-white spectrum**	**Yes / No**	
▪ **Prohibit/control unleashed predatory animals; prohibit outdoor feeding of animals; require sealed rubbish containers**	**Yes / No**	Predator control is not feasible outside the fenced portion of the facility as this is a wildland area
▪ **Provide Worker Seabird Awareness Training to staff**	**Yes / No**	
▪ **Provide outreach materials to staff & guests**	**Yes / No**	
▪ **Host Save Our Shearwaters (SOS) Aid Station**	**Yes / No**	This area is too remote to warrant an aid station

Hokulei Shopping Village

Table 4(j): Seabird Light Attraction Minimization Measures Considered at Hokulei Shopping Village

Minimization Measures Considered	Feasible? (Y / N)	If not Feasible to Implement Measures, Provide Reason
▪ **Change time of light use (lights off earlier)**	**Yes / No**	Security and safety of employees and guests preclude this option
▪ **Deactivate unnecessary lights**	**Yes / No**	This is a new shopping center where lighting was designed to be dark sky compliant
▪ **Replace all outdoor lights with full cut-off fixtures**	**Yes / No**	
▪ **Shield all outdoor lights with full cut-off shields**	**Yes / No**	
▪ **Angle all lights downward**	**Yes / No**	
▪ **Lower intensity (lumens) of outdoor lights**	**Yes / No**	
▪ **Change bulb color to non-white spectrum**	**Yes / No**	
▪ **Prohibit/control unleashed predatory animals; prohibit outdoor feeding of animals; require sealed rubbish containers**	**Yes / No**	
▪ **Provide Worker Seabird Awareness Training to staff**	**Yes / No**	
▪ **Provide outreach materials to staff & guests**	**Yes / No**	
▪ **Host Save Our Shearwaters (SOS) Aid Station**	**Yes / No**	The Lihue Fire Station Aid Station is located less than two miles away

The Shops at Kukuiʻula

Table 4(k): Seabird Light Attraction Minimization Measures Considered at The Shops at Kukuiʻula

Minimization Measures Considered	Feasible? (Y / N)	If not Feasible to Implement Measures, Provide Reason
▪ **Change time of light use (lights off earlier)**	**Yes / <u>No</u>**	Security and safety of employees and guests preclude this option
▪ **Deactivate unnecessary lights**	**<u>Yes</u> / No**	
▪ **Replace all outdoor lights with full cut-off fixtures**	**<u>Yes</u> / No**	
▪ **Shield all outdoor lights with full cut-off shields**	**<u>Yes</u> / No**	
▪ **Angle all lights downward**	**<u>Yes</u> / No**	
▪ **Lower intensity (lumens) of outdoor lights**	**<u>Yes</u> / No**	
▪ **Change bulb color to non-white spectrum**	**<u>Yes</u> / No**	
▪ **Prohibit/control unleashed predatory animals; prohibit outdoor feeding of animals; require sealed rubbish containers**	**<u>Yes</u> / No**	
▪ **Provide Worker Seabird Awareness Training to staff**	**<u>Yes</u> / No**	
▪ **Provide outreach materials to staff & guests**	**<u>Yes</u> / No**	
▪ **Host Save Our Shearwaters (SOS) Aid Station**	**Yes / <u>No</u>**	The Koloa Fire Station Aid Station is located about one quarter mile away

Waipouli Town Center

Table 4(l): Seabird Light Attraction Minimization Measures Considered at Waipouli Town Center

Minimization Measures Considered	Feasible? (Y / N)	If not Feasible to Implement Measures, Provide Reason
▪ **Change time of light use (lights off earlier)**	**Yes / <u>No</u>**	Security and safety of employees and guests preclude this option
▪ **Deactivate unnecessary lights**	**<u>Yes</u> / No**	
▪ **Replace all outdoor lights with full cut-off fixtures**	**<u>Yes</u> / No**	
▪ **Shield all outdoor lights with full cut-off shields**	**<u>Yes</u> / No**	
▪ **Angle all lights downward**	**<u>Yes</u> / No**	
▪ **Lower intensity (lumens) of outdoor lights**	**<u>Yes</u> / No**	
▪ **Change bulb color to non-white spectrum**	**<u>Yes</u> / No**	
▪ **Prohibit/control unleashed predatory animals; prohibit outdoor feeding of animals; require sealed rubbish containers**	**<u>Yes</u> / No**	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.
▪ **Provide Worker Seabird Awareness Training to staff**	**<u>Yes</u> / No**	
▪ **Provide outreach materials to staff & guests**	**<u>Yes</u> / No**	
▪ **Host Save Our Shearwaters (SOS) Aid Station**	**Yes / <u>No</u>**	There is an SOS Aid Station at the Kapaʻa Fire Station, immediately adjacent to this property

Kukuiʻula Development - Plantation Core/The Club
Table 4(m): Seabird Light Attraction Minimization Measures Considered at Kukuiʻula Development - Plantation Core/The Club

Minimization Measures Considered	Feasible? (Y / N)	If not Feasible to Implement Measures, Provide Reason
▪ **Change time of light use (lights off earlier)**	**Yes / <u>No</u>**	Security and safety of employees and guests preclude this option
▪ **Deactivate unnecessary lights**	**<u>Yes</u> / No**	This is a relatively new facility designed to be seabird friendly. There are no unnecessary lights to deactivate.
▪ **Replace all outdoor lights with full cut-off fixtures**	**<u>Yes</u> / No**	
▪ **Shield all outdoor lights with full cut-off shields**	**<u>Yes</u> / No**	
▪ **Angle all lights downward**	**<u>Yes</u> / No**	
▪ **Lower intensity (lumens) of outdoor lights**	**<u>Yes</u> / No**	
▪ **Change bulb color to non-white spectrum**	**<u>Yes</u> / No**	
▪ **Prohibit/control unleashed predatory animals; prohibit outdoor feeding of animals; require sealed rubbish containers**	**<u>Yes</u> / No**	
▪ **Provide Worker Seabird Awareness Training to staff**	**<u>Yes</u> / No**	
▪ **Provide outreach materials to staff & guests**	**<u>Yes</u> / No**	
▪ **Host Save Our Shearwaters (SOS) Aid Station**	**Yes / <u>No</u>**	There is an SOS Aid Station at the Poʻipū Fire Station, located close to this facility

Item 8. <u>Minimization Plans</u>. 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.

Port Allen Solar Farm

Table 5(a): Lighting Minimization Measures at Port Allen Solar Farm

List of Buildings	Minimization Measures	Cost to Implement	Responsible Staff	Timeline
Control building	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.	N/A	McBryde Resources, Inc.	Completed

Port Allen Solar Farm

Table 6(a): Seabird Mortality Minimization Plan at Port Allen Solar Farm

Minimization Measures	Describe minimization method (e.g. trapping, outreach, enact policy)	Cost to Implement	Responsible Staff
Remove & control loose predatory animals at the facility. (Loose animals can kill grounded seabirds and this measure aims to prevent seabird mortality by animals.)		N/A	Operations
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.)	The facility implements this measure. This is a secure site with no public access.	N/A	Operations
Conduct nightly/morning searches to recover downed birds at the property & turn them into SOS following protocols (see monitoring plan below).	Properties with lights which are normally turned off and rarely or never used, will not be searched.	N/A	
Train staff to follow minimization measures.	Training will be provided to staff to ensure their understanding and compliance with minimization measures	N/A	Operations

Port Allen Center I and II

Table 5(b): Lighting Minimization Measures at Port Allen Center I and II

List of Buildings	Minimization Measures	Cost to Implement	Responsible Staff	Timeline
Two steel commercial buildings	A lighting audit was conducted in 2012. Following that audit the exterior lights were replaced with dark sky compliant fixtures.	N/A	Property Manager	Complete

Port Allen Center I and II

Table 6(b): Seabird Mortality Minimization Plan at Port Allen Center I and II

Minimization Measures	Describe minimization method (e.g. trapping, outreach, enact policy)	Cost to Implement	Responsible Staff
Remove & control loose predatory animals at the facility. (Loose animals can kill grounded seabirds and this measure aims to prevent seabird mortality by animals.)	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).	Searches will be conducted as per KSHCP guidance	N/A	Property Manager
Train staff to follow minimization measures.	Training will be conducted annually	N/A	Property Manager

Port Allen South Parcels

Table 5(c): Lighting Minimization Measures at Port Allen South Parcels

List of Buildings	Minimization Measures	Cost to Implement	Responsible Staff	Timeline
Shoreline Parcel – no buildings	N/A	N/A	Property Manager	Complete
BEI Property (three small industrial buildings)	Lighting has been deactivated	N/A	BEI (tenant)	Complete

Port Allen South Parcels

Table 6(c): Seabird Mortality Minimization Plan at Port Allen South Parcels

Minimization Measures	Describe minimization method (e.g. trapping, outreach, enact policy)	Cost to Implement	Responsible Staff
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

List of Buildings	Minimization Measures	Cost to Implement	Responsible Staff	Timeline
None	Streetlights are dark sky compliant	N/A	Property Manager	Complete

Port Allen Parking Lots

Table 6(d): Seabird Mortality Minimization Plan at Port Allen Parking Lots

Minimization Measures	Describe minimization method (e.g. trapping, outreach, enact policy)	Cost to Implement	Responsible Staff
Remove & control loose predatory animals at the facility. (Loose animals can kill grounded seabirds and this measure aims to prevent seabird mortality by animals.)	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 implemented	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).	Searches will be conducted as per KSHCP guidance	N/A	Property Manager
Train staff to follow minimization measures.	Training will be conducted annually	N/A	Property Manager

Port Allen Steel Warehouse

Table 5(e): Lighting Minimization Measures at Port Allen Steel Warehouse

List of Buildings	Minimization Measures	Cost to Implement	Responsible Staff	Timeline
Steel Warehouse	A lighting audit was conducted in 2012, following that audit the exterior lights were replaced with motion activated LED lighting fixtures	N/A	Property Manager	Complete

Port Allen Steel Warehouse

Table 6(e): Seabird Mortality Minimization Plan at Port Allen Steel Warehouse

Minimization Measures	Describe minimization method (e.g. trapping, outreach, enact policy)	Cost to Implement	Responsible Staff
Remove & control loose predatory animals at the facility. (Loose animals can kill grounded seabirds and this measure aims to prevent seabird mortality by animals.)	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 implemented	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).	Searches will be conducted as per KSHCP guidance	N/A	Property Manager
Train staff to follow minimization measures.	Training will be conducted annually	N/A	Property Manager

Port Allen Marina Center

Table 5(f): Lighting Minimization Measures at Port Allen Marina Center

List of Buildings	Minimization Measures	Cost to Implement	Responsible Staff	Timeline
56 low wattage wall sconces mounted on building walls	During the seabird fallout season every other light is turned off at 9:00 pm. Bulbs in the fixtures will be changed out to lower wattage bulbs, and if still too bright plans will be drafted to replace the fixtures.	Cost for new bulbs is negligible. Cost for new fixtures will be determined by future lighting plan.	Property Manger	Timeline for fixture replacement will be determined by future lighting plan.

Port Allen Marina Center

Table 6(f): Seabird Mortality Minimization Plan at Port Allen Marina Center

Minimization Measures	Describe minimization method (e.g. trapping, outreach, enact policy)	Cost to Implement	Responsible Staff
Remove & control loose predatory animals at the facility. (Loose animals can kill grounded seabirds and this measure aims to prevent seabird mortality by animals.)	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 implemented	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).	Searches will be conducted as per KSHCP guidance	N/A	Property Manager
Train staff to follow minimization measures.	Training will be conducted annually	N/A	Property Manager

Pump 3 Hanapepe Valley

Table 5(g): Lighting Minimization Measures at Pump 3 Hanapepe Valley

List of Buildings	Minimization Measures	Cost to Implement	Responsible Staff	Timeline
Control Building	One light has been deactivated	N/A	McBryde Resources operator	Complete
Pump Facility	2 flood lights – not turned on except in emergencies	N/A	McBryde Resources operator	Complete

Pump 3 Hanapepe Valley

Table 6(g): Seabird Mortality Minimization Plan at Pump 3 Hanapepe Valley

Minimization Measures	Describe minimization method (e.g. trapping, outreach, enact policy)	Cost to Implement	Responsible Staff
Remove & control loose predatory animals at the facility. (Loose animals can kill grounded seabirds and this measure aims to prevent seabird mortality by animals.)	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	N/A	McBryde Resources operator
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 implemented	N/A	McBryde Resources operator
Conduct nightly/morning searches to recover downed birds at the property & turn them into SOS following protocols (see monitoring plan below).	Properties with lights which are normally turned off and rarely or never used, will not be searched.	N/A	McBryde Resources operator
Train staff to follow minimization measures.	Training will be conducted annually	N/A	McBryde Sugar operator

Kalaheo Powerhouse

Table 5(h): Lighting Minimization Measures at Kalaheo Powerhouse

List of Buildings	Minimization Measures	Cost to Implement	Responsible Staff	Timeline
4 lights	All lights are dark sky complaint or not visible from the sky. They are only turned on in the case of nighttime emergencies.	N/A	McBryde Resource operator	Complete
2 small wall sconces	These have been deactivated	N/A	McBryde Resources operator	Complete

Kalaheo Powerhouse

Table 6(h): Seabird Mortality Minimization Plan at Kalaheo Powerhouse

Minimization Measures	Describe minimization method (e.g. trapping, outreach, enact policy)	Cost to Implement	Responsible Staff
Remove & control loose predatory animals at the facility. (Loose animals can kill grounded seabirds and this measure aims to prevent seabird mortality by animals.)	In the event that cats or dogs are reported on the property, a pest control company will be hired to remove the predators	N/A	McBryde Resources operator
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 implemented	N/A	McBryde Resources operator
Conduct nightly/morning searches to recover downed birds at the property & turn them into SOS following protocols (see monitoring plan below).	Properties with lights which are normally turned off and rarely or never used, will not be searched.	N/A	McBryde Resources operator
Train staff to follow minimization measures.	Training will be conducted annually	N/A	McBryde Resources operator

Wainiha Powerhouse

Table 5(i): Lighting Minimization Measures at Wainiha Powerhouse

List of Buildings	Minimization Measures	Cost to Implement	Responsible Staff	Timeline
Powerhouse wall lights (3)	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.	N/A	McBryde Resources operator	Complete

Wainiha Powerhouse

Table 6(i): Seabird Mortality Minimization Plan at Wainiha Powerhouse

Minimization Measures	Describe minimization method (e.g. trapping, outreach, enact policy)	Cost to Implement	Responsible Staff
Remove & control loose predatory animals at the facility. (Loose animals can kill grounded seabirds and this measure aims to prevent seabird mortality by animals.)	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	N/A	McBryde Resources operator
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 implemented	N/A	McBryde Resources operator
Conduct nightly/morning searches to recover downed birds at the property & turn them into SOS following protocols (see monitoring plan below).	Properties with lights which are normally turned off and rarely or never used, will not be searched.	N/A	McBryde Resources operator
Train staff to follow minimization measures.	Training will be conducted annually	N/A	McBryde Resources operator

Hokulei Shopping Village

Table 5(j): Lighting Minimization Measures at Hokulei Shopping Village

List of Buildings	Minimization Measures	Cost to Implement	Responsible Staff	Timeline
Shopping Center	This is a new shopping center which was designed to have dark sky compliant lighting	N/A	Property Manager	Complete
	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	N/A	Property Manager	Complete

Hokulei Shopping Village

Table 6(j): Seabird Mortality Minimization Plan at Hokulei Shopping Village

Minimization Measures	Describe minimization method (e.g. trapping, outreach, enact policy)	Cost to Implement	Responsible Staff
Remove & control loose predatory animals at the facility. (Loose animals can kill grounded seabirds and this measure aims to prevent seabird mortality by animals.)	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 implemented	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).	Searches will be conducted as per KSHCP guidance	N/A	Property Manager
Train staff to follow minimization measures.	Training will be conducted annually	N/A	Property Manager

The Shops at Kukuiʻula

Table 5(k): Lighting Minimization Measures at The Shops at Kukuiʻula

List of Buildings	Minimization Measures	Cost to Implement	Responsible Staff	Timeline
67 LED Streetlights	These fixtures are full cutoff dark sky compliant	N/A	Property Manager	Complete
6 Flat panel LED Parking Lights	These fixtures are full cutoff dark sky compliant	N/A	Property Manager	Complete
Numerous shop lighting fixtures	Management and ownership are developing a lighting plan to address fixtures that are not currently dark sky compliant	Cost for new fixtures will be determined by future lighting plan.	Property Manager	Timeline for fixture replacement will be determined by future lighting plan.

The Shops at Kukuiʻula

Table 6(k): Seabird Mortality Minimization Plan at The Shops at Kukuiʻula

Minimization Measures	Describe minimization method (e.g. trapping, outreach, enact policy)	Cost to Implement	Responsible Staff
Remove & control loose predatory animals at the facility. (Loose animals can kill grounded seabirds and this measure aims to prevent seabird mortality by animals.)	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 implemented	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).	Searches will be conducted as per KSHCP guidance	N/A	Property Manager
Train staff to follow minimization measures.	Training will be conducted annually	N/A	Property Manager

Waipouli Town Center

Table 5(l): Lighting Minimization Measures at Waipouli Town Center

List of Buildings	Minimization Measures	Cost to Implement	Responsible Staff	Timeline
Shopping Center	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.	N/A	Property Manager	Complete

Waipouli Town Center

Table 6(l): Seabird Mortality Minimization Plan at Waipouli Town Center

Minimization Measures	Describe minimization method (e.g. trapping, outreach, enact policy)	Cost to Implement	Responsible Staff
Remove & control loose predatory animals at the facility. (Loose animals can kill grounded seabirds and this measure aims to prevent seabird mortality by animals.)	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.	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 implemented	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).	Searches will be conducted as per KSHCP guidance	N/A	Property Manager
Train staff to follow minimization measures.	Training will be conducted annually	N/A	Property Manager

Kukuiʻula Development (Plantation Core/The Club)

Table 5(m): Lighting Minimization Measures at Kukuiʻula Development (Plantation Core/The Club)

List of Buildings	Minimization Measures	Cost to Implement	Responsible Staff	Timeline
Parking Lots	All lighting is fully shielded, low wattage, and dark sky compliant	N/A	Engineering Senior Manager	Complete
Cart Barn and Mechanicals	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.	N/A	Engineering Senior Manager	Complete
Porte Cochere	All lighting is fully shielded, low wattage and dark sky compliant	N/A	Engineering Senior Manager	Complete
Kukuiʻula Realty	All lighting is fully shielded, low wattage and dark sky compliant	N/A	Engineering Senior Manager	Complete
The Club	All lighting fixtures are shielded from above and most are under eaves. The gas pencil light fixtures are extremely dim and are shielded from above.	N/A	Engineering Senior Manager	Complete
Pool area structures	All lighting is fully shielded, low wattage, and dark sky compliant	N/A	Engineering Senior Manager	Complete
Swimming Pool	All lighting is the lowest wattage necessary for human safety and security.	N/A	Engineering Senior Manager	Complete
Landscaping	All lighting is fully shielded low wattage and dark sky compliant.	N/A	Engineering Senior Manager	Complete

Kukuiʻula Development (Plantation Core/The Club)

Table 6(m): Seabird Mortality Minimization Plan at Kukuiʻula Development (Plantation Core/The Club)

Minimization Measures	Describe minimization method (e.g. trapping, outreach, enact policy)	Cost to Implement	Responsible Staff
Remove & control loose predatory animals at the facility. (Loose animals can kill grounded seabirds and this measure aims to prevent seabird mortality by animals.)	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 implemented	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).	Searches will be conducted as per KSHCP guidance	N/A	Property Manager
Train staff to follow minimization measures.	Training will be conducted annually	N/A	Property Manager

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

Please provide the following information for the protocol items below		
Item	**Protocol** (fill in protocol & provide reasons)	**KSHCP Guideline**
Percentage of the total property that will be searched & the total area to be searched	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.	**Search as much area as possible**
Frequency of searches (# per day or per week)	N/A	**Twice daily**
Time of day of searches	N/A	**2-3 hours after sunset, and within 3 hours after sunrise**
Number of searchers per search area	N/A	**Depends on site conditions and safety considerations and vegetation, nearby hazards/threats**
Proposed training	Seabird Awareness training will be conducted for employees and operators once a year. See Appendix B1.	**Annual training covering seabird identification, seabird handling, response procedures, verified and documented**

Port Allen Center I and II

Table 7(b): Covered Seabird Take Monitoring Protocols at Port Allen Center I and II

Please provide the following information for the protocol items below		
Item	**Protocol** (fill in protocol & provide reasons)	**KSHCP Guideline**
Percentage of the total property that will be searched & the total area to be searched	100%	**Search as much area as possible**
Frequency of searches (# per day or per week)	Twice daily	**Twice daily**
Time of day of searches	2-3 hours after sunset, and within 3 hours after sunrise	**2-3 hours after sunset, and within 3 hours after sunrise**
Number of searchers per search area	1-2 searches, depending on safety considerations	**Depends on site conditions and safety considerations and vegetation, nearby hazards/threats**
Proposed training	Seabird Awareness training will be conducted for employees and operators once a year. See Appendix B1.	**Annual training covering seabird identification, seabird handling, response procedures, verified and documented**

Port Allen South Parcels

Table 7(c): Covered Seabird Take Monitoring Protocols at Port Allen South Parcels

Please provide the following information for the protocol items below		
Item	**Protocol** (fill in protocol & provide reasons)	**KSHCP Guideline**
Percentage of the total property that will be searched & the total area to be searched	Shoreline Parcel will not be searched as there are no lights associated with it	**Search as much area as possible**
Frequency of searches (# per day or per week)	The BEI parcel will be searched twice daily	**Twice daily**
Time of day of searches	The BEI parcel will be searched 2-3 hours after sunset, and within 3 hours after sunrise	**2-3 hours after sunset, and within 3 hours after sunrise**
Number of searchers per search area	One searcher for the BEI parcel	**Depends on site conditions and safety considerations and vegetation, nearby hazards/threats**
Proposed training	Seabird Awareness training will be conducted for employees and operators once a year. See Appendix B1.	**Annual training covering seabird identification, seabird handling, response procedures, verified and documented**

Port Allen Parking Lots

Table 7(d): Covered Seabird Take Monitoring Protocols at Port Allen Parking Lots

Please provide the following information for the protocol items below		
Item	**Protocol** (fill in protocol & provide reasons)	**KSHCP Guideline**
Percentage of the total property that will be searched & the total area to be searched	100%	**Search as much area as possible**
Frequency of searches (# per day or per week)	Twice daily	**Twice daily**
Time of day of searches	2-3 hours after sunset, and within 3 hours after sunrise	**2-3 hours after sunset, and within 3 hours after sunrise**
Number of searchers per search area	One	**Depends on site conditions and safety considerations and vegetation, nearby hazards/threats**
Proposed training	Seabird Awareness training will be conducted for employees and operators once a year. See Appendix B1.	**Annual training covering seabird identification, seabird handling, response procedures, verified and documented**

Port Allen Steel Warehouse

Table 7(e): Covered Seabird Take Monitoring Protocols at Port Allen Steel Warehouse

Please provide the following information for the protocol items below		
Item	**Protocol** (fill in protocol & provide reasons)	**KSHCP Guideline**
Percentage of the total property that will be searched & the total area to be searched	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.	**Search as much area as possible**
Frequency of searches (# per day or per week)	Twice daily	**Twice daily**
Time of day of searches	2-3 hours after sunset, and within 3 hours after sunrise	**2-3 hours after sunset, and within 3 hours after sunrise**
Number of searchers per search area	One	**Depends on site conditions and safety considerations and vegetation, nearby hazards/threats**
Proposed training	Seabird Awareness training will be conducted for employees and operators once a year. See Appendix B1.	**Annual training covering seabird identification, seabird handling, response procedures, verified and documented**

Port Allen Marina Center

Table 7(f): Covered Seabird Take Monitoring Protocols at Port Allen Marina Center

Please provide the following information for the protocol items below		
Item	**Protocol** (fill in protocol & provide reasons)	**KSHCP Guideline**
Percentage of the total property that will be searched & the total area to be searched	100% of this site is searchable, as it is paved or built on	**Search as much area as possible**
Frequency of searches (# per day or per week)	Twice daily	**Twice daily**
Time of day of searches	2-3 hours after sunset, and within 3 hours after sunrise	**2-3 hours after sunset, and within 3 hours after sunrise**
Number of searchers per search area	One	**Depends on site conditions and safety considerations and vegetation, nearby hazards/threats**
Proposed training	Seabird Awareness training will be conducted for employees and operators once a year. See Appendix B1.	**Annual training covering seabird identification, seabird handling, response procedures, verified and documented**

Pump 3 Hanapepe Valley

Table 7(g): Covered Seabird Take Monitoring Protocols at Pump 3 Hanapepe Valley

Please provide the following information for the protocol items below		
Item	**Protocol** (fill in protocol & provide reasons)	**KSHCP Guideline**
Percentage of the total property that will be searched & the total area to be searched	Properties with lights which are normally turned off and rarely or never used, will not be searched.	**Search as much area as possible**
Frequency of searches (# per day or per week)	N/A	**Twice daily**
Time of day of searches	N/A	**2-3 hours after sunset, and within 3 hours after sunrise**
Number of searchers per search area	One	**Depends on site conditions and safety considerations and vegetation, nearby hazards/threats**
Proposed training	Seabird Awareness training will be conducted for employees and operators once a year. See Appendix B1.	**Annual training covering seabird identification, seabird handling, response procedures, verified and documented**

Kalaheo Powerhouse

Table 7(h): Covered Seabird Take Monitoring Protocols at Kalaheo Powerhouse

Please provide the following information for the protocol items below		
Item	**Protocol** (fill in protocol & provide reasons)	**KSHCP Guideline**
Percentage of the total property that will be searched & the total area to be searched	Properties with lights which are normally turned off and rarely or never used, will not be searched.	**Search as much area as possible**
Frequency of searches (# per day or per week)	N/A	**Twice daily**
Time of day of searches	N/A	**2-3 hours after sunset, and within 3 hours after sunrise**
Number of searchers per search area	One	**Depends on site conditions and safety considerations and vegetation, nearby hazards/threats**
Proposed training	Seabird Awareness training will be conducted for employees and operators once a year. See Appendix B1.	**Annual training covering seabird identification, seabird handling, response procedures, verified and documented**

Wainiha Powerhouse

Table 7(i): Covered Seabird Take Monitoring Protocols at Wainiha Powerhouse

Please provide the following information for the protocol items below		
Item	**Protocol** (fill in protocol & provide reasons)	**KSHCP Guideline**
Percentage of the total property that will be searched & the total area to be searched	Properties with lights which are normally turned off and rarely or never used, will not be searched.	**Search as much area as possible**
Frequency of searches (# per day or per week)	N/A	**Twice daily**
Time of day of searches	N/A	**2-3 hours after sunset, and within 3 hours after sunrise**
Number of searchers per search area	One	**Depends on site conditions and safety considerations and vegetation, nearby hazards/threats**
Proposed training	Seabird Awareness training will be conducted for employees and operators once a year. See Appendix B1.	**Annual training covering seabird identification, seabird handling, response procedures, verified and documented**

Hokulei Shopping Village

Table 7(j): Covered Seabird Take Monitoring Protocols at Hokulei Shopping Village

Please provide the following information for the protocol items below		
Item	**Protocol** (fill in protocol & provide reasons)	**KSHCP Guideline**
Percentage of the total property that will be searched & the total area to be searched	100% of this site is searchable	**Search as much area as possible**
Frequency of searches (# per day or per week)	A minimum of twice daily	**Twice daily**
Time of day of searches	2-3 hours after sunset, and within 3 hours after sunrise	**2-3 hours after sunset, and within 3 hours after sunrise**
Number of searchers per search area	One to three	**Depends on site conditions and safety considerations and vegetation, nearby hazards/threats**
Proposed training	Seabird Awareness training will be conducted for employees and operators once a year. See Appendix B1.	**Annual training covering seabird identification, seabird handling, response procedures, verified and documented**

The Shops at Kukuiʻula

Table 7(k): Covered Seabird Take Monitoring Protocols at The Shops at Kukuiʻula

Please provide the following information for the protocol items below		
Item	**Protocol** (fill in protocol & provide reasons)	**KSHCP Guideline**
Percentage of the total property that will be searched & the total area to be searched	100% of this site is searchable	**Search as much area as possible**
Frequency of searches (# per day or per week)	A minimum of twice daily	**Twice daily**
Time of day of searches	2-3 hours after sunset, and within 3 hours after sunrise	**2-3 hours after sunset, and within 3 hours after sunrise**
Number of searchers per search area	One to three	**Depends on site conditions and safety considerations and vegetation, nearby hazards/threats**
Proposed training	Seabird Awareness training will be conducted for employees and operators once a year. See Appendix B1.	**Annual training covering seabird identification, seabird handling, response procedures, verified and documented**

Waipouli Town Center

Table 7(l): Covered Seabird Take Monitoring Protocols at Waipouli Town Center

Please provide the following information for the protocol items below		
Item	**Protocol** (fill in protocol & provide reasons)	**KSHCP Guideline**
Percentage of the total property that will be searched & the total area to be searched	100% of this site is searchable as it is paved or built on	**Search as much area as possible**
Frequency of searches (# per day or per week)	A minimum of twice daily	**Twice daily**
Time of day of searches	2-3 hours after sunset, and within 3 hours after sunrise	**2-3 hours after sunset, and within 3 hours after sunrise**
Number of searchers per search area	One to three	**Depends on site conditions and safety considerations and vegetation, nearby hazards/threats**
Proposed training	Seabird Awareness training will be conducted for employees and operators once a year. See Appendix B1.	**Annual training covering seabird identification, seabird handling, response procedures, verified and documented**

Kukuiʻula Development (Plantation Core/The Club)

Table 7(m): Covered Seabird Take Monitoring Protocols at Kukuiʻula Development (Plantation Core/The Club)

Please provide the following information for the protocol items below		
Item	**Protocol** (fill in protocol & provide reasons)	**KSHCP Guideline**
Percentage of the total property that will be searched & the total area to be searched	100% of this site is searchable	**Search as much area as possible**
Frequency of searches (# per day or per week)	A minimum of twice daily	**Twice daily**
Time of day of searches	2-3 hours after sunset, and within 3 hours after sunrise	**2-3 hours after sunset, and within 3 hours after sunrise**
Number of searchers per search area	One to three	**Depends on site conditions and safety considerations and vegetation, nearby hazards/threats**
Proposed training	Seabird Awareness training will be conducted for employees and operators once a year. See Appendix B1.	**Annual training covering seabird identification, seabird handling, response procedures, verified and documented**

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.

Port Allen Solar Farm

Table 8(a): Green Sea Turtle Monitoring Protocols – Part A: Monitoring to Detect Nests at Port Allen Solar Farm

Please provide search protocols for detecting nests of the green sea turtle (Attach pages as needed)		
Item	**Protocol** (fill in protocol & provide reasons)	**KSHCP Guideline**
Location & description of the beach, or beaches, surveyed and the linear distance of the beach	Not applicable	**Beach area surveyed should coincide with visibility from the facility with the lights**
Frequency of searches (# per day or per week)	Not applicable	**Weekly during nesting season (typ. May 15 to end of August)**
Number of searchers per search area	Not applicable	**Depends on site conditions and safety considerations**
Proposed training	Not applicable	**Searchers should receive annual training conducted by the DLNR or the USFWS, or their designee (See item 9a)**

Port Allen Solar Farm

Table 9(a): Green Sea Turtle Monitoring Protocols – Part B: Monitoring of Identified Nests & Minimization for Port Allen Solar Farm

Please provide search protocols to monitor identified nests (from Part A) of the green sea turtle (Attach pages as needed)		
Item	**Protocol** (fill in protocol & provide reasons)	**KSHCP Guideline**
Frequency of checks (# per day or per week)	Not applicable	**Active nests should be monitored every 1-2 days; then daily during expected hatching date**
Light avoidance	Not applicable	**If lights cannot be deactivated or shielded from the nest, each nest should be screened from visible light**
Number of searchers per search area	Not applicable	**Depends on site conditions and safety considerations**

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)		
Item	**Protocol** (fill in protocol & provide reasons)	**KSHCP Guideline**
Location & description of the beach, or beaches, surveyed and the linear distance of the beach	Not applicable	**Beach area surveyed should coincide with visibility from the facility with the lights**
Frequency of searches (# per day or per week)	Not applicable	**Weekly during nesting season (typ. May 15 to end of August)**
Number of searchers per search area	Not applicable	**Depends on site conditions and safety considerations**
Proposed training	Not applicable	**Searchers should receive annual training conducted by the DLNR or the USFWS, or their designee (See item 9a)**

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

Please provide search protocols to monitor identified nests (from Part A) of the green sea turtle (Attach pages as needed)		
Item	**Protocol** (fill in protocol & provide reasons)	**KSHCP Guideline**
Frequency of checks (# per day or per week)	Not applicable	**Active nests should be monitored every 1-2 days; then daily during expected hatching date**
Light avoidance	Not applicable	**If lights cannot be deactivated or shielded from the nest, each nest should be screened from visible light**
Number of searchers per search area	Not applicable	**Depends on site conditions and safety considerations**

Port Allen South Parcels

Table 8(c): Green Sea Turtle Monitoring Protocols – Part A: Monitoring to Detect Nests at Port Allen South Parcels

Please provide search protocols for detecting nests of the green sea turtle (Attach pages as needed)		
Item	**Protocol** (fill in protocol & provide reasons)	**KSHCP Guideline**
Location & description of the beach, or beaches, surveyed and the linear distance of the beach	Not applicable	**Beach area surveyed should coincide with visibility from the facility with the lights**
Frequency of searches (# per day or per week)	Not applicable	**Weekly during nesting season (typ. May 15 to end of August)**
Number of searchers per search area	Not applicable	**Depends on site conditions and safety considerations**
Proposed training	Not applicable	**Searchers should receive annual training conducted by the DLNR or the USFWS, or their designee (See item 9a)**

Port Allen South Parcels

Table 9(c): Green Sea Turtle Monitoring Protocols – Part B: Monitoring of Identified Nests & Minimization for Port Allen South Parcels

Please provide search protocols to monitor identified nests (from Part A) of the green sea turtle (Attach pages as needed)		
Item	**Protocol** (fill in protocol & provide reasons)	**KSHCP Guideline**
Frequency of checks (# per day or per week)	Not applicable	**Active nests should be monitored every 1-2 days; then daily during expected hatching date**
Light avoidance	Not applicable	**If lights cannot be deactivated or shielded from the nest, each nest should be screened from visible light**
Number of searchers per search area	Not applicable	**Depends on site conditions and safety considerations**

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)		
Item	**Protocol** (fill in protocol & provide reasons)	**KSHCP Guideline**
Location & description of the beach, or beaches, surveyed and the linear distance of the beach	Not applicable	**Beach area surveyed should coincide with visibility from the facility with the lights**
Frequency of searches (# per day or per week)	Not applicable	**Weekly during nesting season (typ. May 15 to end of August)**
Number of searchers per search area	Not applicable	**Depends on site conditions and safety considerations**
Proposed training	Not applicable	**Searchers should receive annual training conducted by the DLNR or the USFWS, or their designee (See item 9a)**

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)		
Item	**Protocol** (fill in protocol & provide reasons)	**KSHCP Guideline**
Frequency of checks (# per day or per week)	Not applicable	**Active nests should be monitored every 1-2 days; then daily during expected hatching date**
Light avoidance	Not applicable	**If lights cannot be deactivated or shielded from the nest, each nest should be screened from visible light**
Number of searchers per search area	Not applicable	**Depends on site conditions and safety considerations**

Port Allen Steel Warehouse

Table 8(e): Green Sea Turtle Monitoring Protocols – Part A: Monitoring to Detect Nests at Port Allen Steel Warehouse

Please provide search protocols for detecting nests of the green sea turtle (Attach pages as needed)		
Item	**Protocol** (fill in protocol & provide reasons)	**KSHCP Guideline**
Location & description of the beach, or beaches, surveyed and the linear distance of the beach	Not applicable	**Beach area surveyed should coincide with visibility from the facility with the lights**
Frequency of searches (# per day or per week)	Not applicable	**Weekly during nesting season (typ. May 15 to end of August)**
Number of searchers per search area	Not applicable	**Depends on site conditions and safety considerations**
Proposed training	Not applicable	**Searchers should receive annual training conducted by the DLNR or the USFWS, or their designee (See item 9a)**

Port Allen Steel Warehouse

Table 9(e): Green Sea Turtle Monitoring Protocols – Part B: Monitoring of Identified Nests & Minimization for Port Allen Steel Warehouse

Please provide search protocols to monitor identified nests (from Part A) of the green sea turtle (Attach pages as needed)		
Item	**Protocol** (fill in protocol & provide reasons)	**KSHCP Guideline**
Frequency of checks (# per day or per week)	Not applicable	**Active nests should be monitored every 1-2 days; then daily during expected hatching date**
Light avoidance	Not applicable	**If lights cannot be deactivated or shielded from the nest, each nest should be screened from visible light**
Number of searchers per search area	Not applicable	**Depends on site conditions and safety considerations**

Port Allen Marina Center

Table 8(f): Green Sea Turtle Monitoring Protocols – Part A: Monitoring to Detect Nests at Port Allen Marina Center

Please provide search protocols for detecting nests of the green sea turtle (Attach pages as needed)		
Item	**Protocol** (fill in protocol & provide reasons)	**KSHCP Guideline**
Location & description of the beach, or beaches, surveyed and the linear distance of the beach	Not applicable	**Beach area surveyed should coincide with visibility from the facility with the lights**
Frequency of searches (# per day or per week)	Not applicable	**Weekly during nesting season (typ. May 15 to end of August)**
Number of searchers per search area	Not applicable	**Depends on site conditions and safety considerations**
Proposed training	Not applicable	**Searchers should receive annual training conducted by the DLNR or the USFWS, or their designee (See item 9a)**

Port Allen Marina Center

Table 9(f): Green Sea Turtle Monitoring Protocols – Part B: Monitoring of Identified Nests & Minimization for Port Allen Marina Center

Please provide search protocols to monitor identified nests (from Part A) of the green sea turtle (Attach pages as needed)		
Item	**Protocol** (fill in protocol & provide reasons)	**KSHCP Guideline**
Frequency of checks (# per day or per week)	Not applicable	**Active nests should be monitored every 1-2 days; then daily during expected hatching date**
Light avoidance	Not applicable	**If lights cannot be deactivated or shielded from the nest, each nest should be screened from visible light**
Number of searchers per search area	Not applicable	**Depends on site conditions and safety considerations**
Proposed training	Not applicable	**Searchers should receive annual training conducted by the DLNR or the USFWS, or their designee (See item 9a)**

Pump 3 Hanapepe Valley

Table 8(g): Green Sea Turtle Monitoring Protocols – Part A: Monitoring to Detect Nests at Pump 3 Hanapepe Valley

Please provide search protocols for detecting nests of the green sea turtle (Attach pages as needed)		
Item	**Protocol** (fill in protocol & provide reasons)	**KSHCP Guideline**
Location & description of the beach, or beaches, surveyed and the linear distance of the beach	Not applicable	**Beach area surveyed should coincide with visibility from the facility with the lights**
Frequency of searches (# per day or per week)	Not applicable	**Weekly during nesting season (typ. May 15 to end of August)**
Number of searchers per search area	Not applicable	**Depends on site conditions and safety considerations**
Proposed training	Not applicable	**Searchers should receive annual training conducted by the DLNR or the USFWS, or their designee (See item 9a)**

Pump 3 Hanapepe Valley

Table 9(g): Green Sea Turtle Monitoring Protocols – Part B: Monitoring of Identified Nests & Minimization for Pump 3 Hanapepe Valley

Please provide search protocols to monitor identified nests (from Part A) of the green sea turtle (Attach pages as needed)		
Item	**Protocol** (fill in protocol & provide reasons)	**KSHCP Guideline**
Frequency of checks (# per day or per week)	Not applicable	**Active nests should be monitored every 1-2 days; then daily during expected hatching date**
Light avoidance	Not applicable	**If lights cannot be deactivated or shielded from the nest, each nest should be screened from visible light**
Number of searchers per search area	Not applicable	**Depends on site conditions and safety considerations**
Proposed training	Not applicable	**Searchers should receive annual training conducted by the DLNR or the USFWS, or their designee (See item 9a)**

Kalaheo Powerhouse

Table 8(h): Green Sea Turtle Monitoring Protocols – Part A: Monitoring to Detect Nests at Kalaheo Powerhouse

Please provide search protocols for detecting nests of the green sea turtle (Attach pages as needed)		
Item	**Protocol** (fill in protocol & provide reasons)	**KSHCP Guideline**
Location & description of the beach, or beaches, surveyed and the linear distance of the beach	Not applicable	**Beach area surveyed should coincide with visibility from the facility with the lights**
Frequency of searches (# per day or per week)	Not applicable	**Weekly during nesting season (typ. May 15 to end of August)**
Number of searchers per search area	Not applicable	**Depends on site conditions and safety considerations**
Proposed training	Not applicable	**Searchers should receive annual training conducted by the DLNR or the USFWS, or their designee (See item 9a)**

Kalaheo Powerhouse

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)		
Item	**Protocol** (fill in protocol & provide reasons)	**KSHCP Guideline**
Frequency of checks (# per day or per week)	Not applicable	**Active nests should be monitored every 1-2 days; then daily during expected hatching date**
Light avoidance	Not applicable	**If lights cannot be deactivated or shielded from the nest, each nest should be screened from visible light**
Number of searchers per search area	Not applicable	**Depends on site conditions and safety considerations**
Proposed training	Not applicable	**Searchers should receive annual training conducted by the DLNR or the USFWS, or their designee (See item 9a)**

Wainiha Powerhouse

Table 8(i): Green Sea Turtle Monitoring Protocols – Part A: Monitoring to Detect Nests at Wainiha Powerhouse

Please provide search protocols for detecting nests of the green sea turtle (Attach pages as needed)		
Item	**Protocol** (fill in protocol & provide reasons)	**KSHCP Guideline**
Location & description of the beach, or beaches, surveyed and the linear distance of the beach	Not applicable	**Beach area surveyed should coincide with visibility from the facility with the lights**
Frequency of searches (# per day or per week)	Not applicable	**Weekly during nesting season (typ. May 15 to end of August)**
Number of searchers per search area	Not applicable	**Depends on site conditions and safety considerations**
Proposed training	Not applicable	**Searchers should receive annual training conducted by the DLNR or the USFWS, or their designee (See item 9a)**

Wainiha Powerhouse

Table 9(i): Green Sea Turtle Monitoring Protocols – Part B: Monitoring of Identified Nests & Minimization for Wainiha Powerhouse

Please provide search protocols to monitor identified nests (from Part A) of the green sea turtle (Attach pages as needed)		
Item	**Protocol** (fill in protocol & provide reasons)	**KSHCP Guideline**
Frequency of checks (# per day or per week)	Not applicable	**Active nests should be monitored every 1-2 days; then daily during expected hatching date**
Light avoidance	Not applicable	**If lights cannot be deactivated or shielded from the nest, each nest should be screened from visible light**
Number of searchers per search area	Not applicable	**Depends on site conditions and safety considerations**
Proposed training	Not applicable	**Searchers should receive annual training conducted by the DLNR or the USFWS, or their designee (See item 9a)**

Hokulei Shopping Village

Table 8(j): Green Sea Turtle Monitoring Protocols – Part A: Monitoring to Detect Nests at Hokulei Shopping Village

Please provide search protocols for detecting nests of the green sea turtle (Attach pages as needed)		
Item	**Protocol** (fill in protocol & provide reasons)	**KSHCP Guideline**
Location & description of the beach, or beaches, surveyed and the linear distance of the beach	Not applicable	**Beach area surveyed should coincide with visibility from the facility with the lights**
Frequency of searches (# per day or per week)	Not applicable	**Weekly during nesting season (typ. May 15 to end of August)**
Number of searchers per search area	Not applicable	**Depends on site conditions and safety considerations**
Proposed training	Not applicable	**Searchers should receive annual training conducted by the DLNR or the USFWS, or their designee (See item 9a)**

Hokulei Shopping Village

Table 9(j): Green Sea Turtle Monitoring Protocols – Part B: Monitoring of Identified Nests & Minimization for Hokulei Shopping Village

Please provide search protocols to monitor identified nests (from Part A) of the green sea turtle (Attach pages as needed)		
Item	**Protocol** (fill in protocol & provide reasons)	**KSHCP Guideline**
Frequency of checks (# per day or per week)	Not applicable	**Active nests should be monitored every 1-2 days; then daily during expected hatching date**
Light avoidance	Not applicable	**If lights cannot be deactivated or shielded from the nest, each nest should be screened from visible light**
Number of searchers per search area	Not applicable	**Depends on site conditions and safety considerations**
Proposed training	Not applicable	**Searchers should receive annual training conducted by the DLNR or the USFWS, or their designee (See item 9a)**

The Shops at Kukuiʻula

Table 8(k): Green Sea Turtle Monitoring Protocols – Part A: Monitoring to Detect Nests at The Shops at Kukuiʻula

Please provide search protocols for detecting nests of the green sea turtle (Attach pages as needed)		
Item	**Protocol** (fill in protocol & provide reasons)	**KSHCP Guideline**
Location & description of the beach, or beaches, surveyed and the linear distance of the beach	Not applicable	**Beach area surveyed should coincide with visibility from the facility with the lights**
Frequency of searches (# per day or per week)	Not applicable	**Weekly during nesting season (typ. May 15 to end of August)**
Number of searchers per search area	Not applicable	**Depends on site conditions and safety considerations**
Proposed training	Not applicable	**Searchers should receive annual training conducted by the DLNR or the USFWS, or their designee (See item 9a)**

The Shops at Kukuiʻula

Table 9(k): Green Sea Turtle Monitoring Protocols – Part B: Monitoring of Identified Nests & Minimization for The Shops at Kukuiʻula

Please provide search protocols to monitor identified nests (from Part A) of the green sea turtle (Attach pages as needed)		
Item	**Protocol** (fill in protocol & provide reasons)	**KSHCP Guideline**
Frequency of checks (# per day or per week)	Not applicable	**Active nests should be monitored every 1-2 days; then daily during expected hatching date**
Light avoidance	Not applicable	**If lights cannot be deactivated or shielded from the nest, each nest should be screened from visible light**
Number of searchers per search area	Not applicable	**Depends on site conditions and safety considerations**
Proposed training	Not applicable	**Searchers should receive annual training conducted by the DLNR or the USFWS, or their designee (See item 9a)**

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

Please provide search protocols for detecting nests of the green sea turtle (Attach pages as needed)		
Item	**Protocol** (fill in protocol & provide reasons)	**KSHCP Guideline**
Location & description of the beach, or beaches, surveyed and the linear distance of the beach	Not applicable	**Beach area surveyed should coincide with visibility from the facility with the lights**
Frequency of searches (# per day or per week)	Not applicable	**Weekly during nesting season (typ. May 15 to end of August)**
Number of searchers per search area	Not applicable	**Depends on site conditions and safety considerations**
Proposed training	Not applicable	**Searchers should receive annual training conducted by the DLNR or the USFWS, or their designee (See item 9a)**

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 (Attach pages as needed)		
Item	**Protocol** (fill in protocol & provide reasons)	**KSHCP Guideline**
Frequency of checks (# per day or per week)	Not applicable	**Active nests should be monitored every 1-2 days; then daily during expected hatching date**
Light avoidance	Not applicable	**If lights cannot be deactivated or shielded from the nest, each nest should be screened from visible light**
Number of searchers per search area	Not applicable	**Depends on site conditions and safety considerations**
Proposed training	Not applicable	**Searchers should receive annual training conducted by the DLNR or the USFWS, or their designee (See item 9a)**

Kukuiʻula Development (Plantation Core/The Club)

Table 8(m): Green Sea Turtle Monitoring Protocols – Part A: Monitoring to Detect Nests at Kukuiʻula Development (Plantation Core/The Club)

Please provide search protocols for detecting nests of the green sea turtle (Attach pages as needed)		
Item	**Protocol** (fill in protocol & provide reasons)	**KSHCP Guideline**
Location & description of the beach, or beaches, surveyed and the linear distance of the beach	Not applicable	**Beach area surveyed should coincide with visibility from the facility with the lights**
Frequency of searches (# per day or per week)	Not applicable	**Weekly during nesting season (typ. May 15 to end of August)**
Number of searchers per search area	Not applicable	**Depends on site conditions and safety considerations**
Proposed training	Not applicable	**Searchers should receive annual training conducted by the DLNR or the USFWS, or their designee (See item 9a)**

Kukuiʻula Development (Plantation Core/The Club)

Table 9(m): Green Sea Turtle Monitoring Protocols – Part B: Monitoring of Identified Nests & Minimization at Kukuiʻula Development (Plantation Core/The Club)

Please provide search protocols to monitor identified nests (from Part A) of the green sea turtle (Attach pages as needed)		
Item	**Protocol** (fill in protocol & provide reasons)	**KSHCP Guideline**
Frequency of checks (# per day or per week)	Not applicable	**Active nests should be monitored every 1-2 days; then daily during expected hatching date**
Light avoidance	Not applicable	**If lights cannot be deactivated or shielded from the nest, each nest should be screened from visible light**
Number of searchers per search area	Not applicable	**Depends on site conditions and safety considerations**
Proposed training	Not applicable	**Searchers should receive annual training conducted by the DLNR or the USFWS, or their designee (See item 9a)**

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 Kukuiʻula
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).

Kukuiʻula Development (Plantation Core/The Club)
Seabird Awareness and Response Training will be provided to Kukuiʻula 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 Kukuiʻula

The Shops at Kukuiʻula 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.

Kukuiʻula Development (Plantation Core/The Club)

Kukuiʻula Development will do outreach to staff during the permit term. During the seabird fledging season they will:

- Distribute seabird awareness pamphlets to Kukuiʻula 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

	Newell's Shearwater	Hawaiian Petrel	Band-rumped Storm Petrel
1. Annual average number (SOS data – or – monitoring data) of downed NESH (5 most recent years), HAPE or BRSP (15 most recent years)	3	0	0
2. Annual observed lethal take estimate (12% of 1, all downed birds)	.36	0	0
3. Annual unobserved lethal take estimate (e.g. 100% of 1, all downed birds if 50% searcher efficiency assumed)	3	0	0
4. Total estimated annual lethal take from light attraction (2+3)	3.36	0	0
Requested Annual Lethal Take	3.46	.1	.033
Requested Take Over Permit Term	104	3	1

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:

Age Class	Annual Take Estimate: Fledglings	Annual Take Estimate: Adults or Sub-Adults	Take Limit for License/Permit Term
Mortality (Lethal)			
Injury (Non-lethal)			

Table 12: Hawaiian Petrel:

Age Class	Annual Take Estimate: Fledglings	Annual Take Estimate: Adults or Sub-Adults	Take Limit for License/Permit Term
Mortality (Lethal)			
Injury (Non-lethal)			

Table 13: Band-Rumped Storm Petrel:

Age Class	Annual Take Estimate: Fledglings	Annual Take Estimate: Adults or Sub-Adults	Take Limit for License/Permit Term
Mortality (Lethal)			
Injury (Non-lethal)			

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)

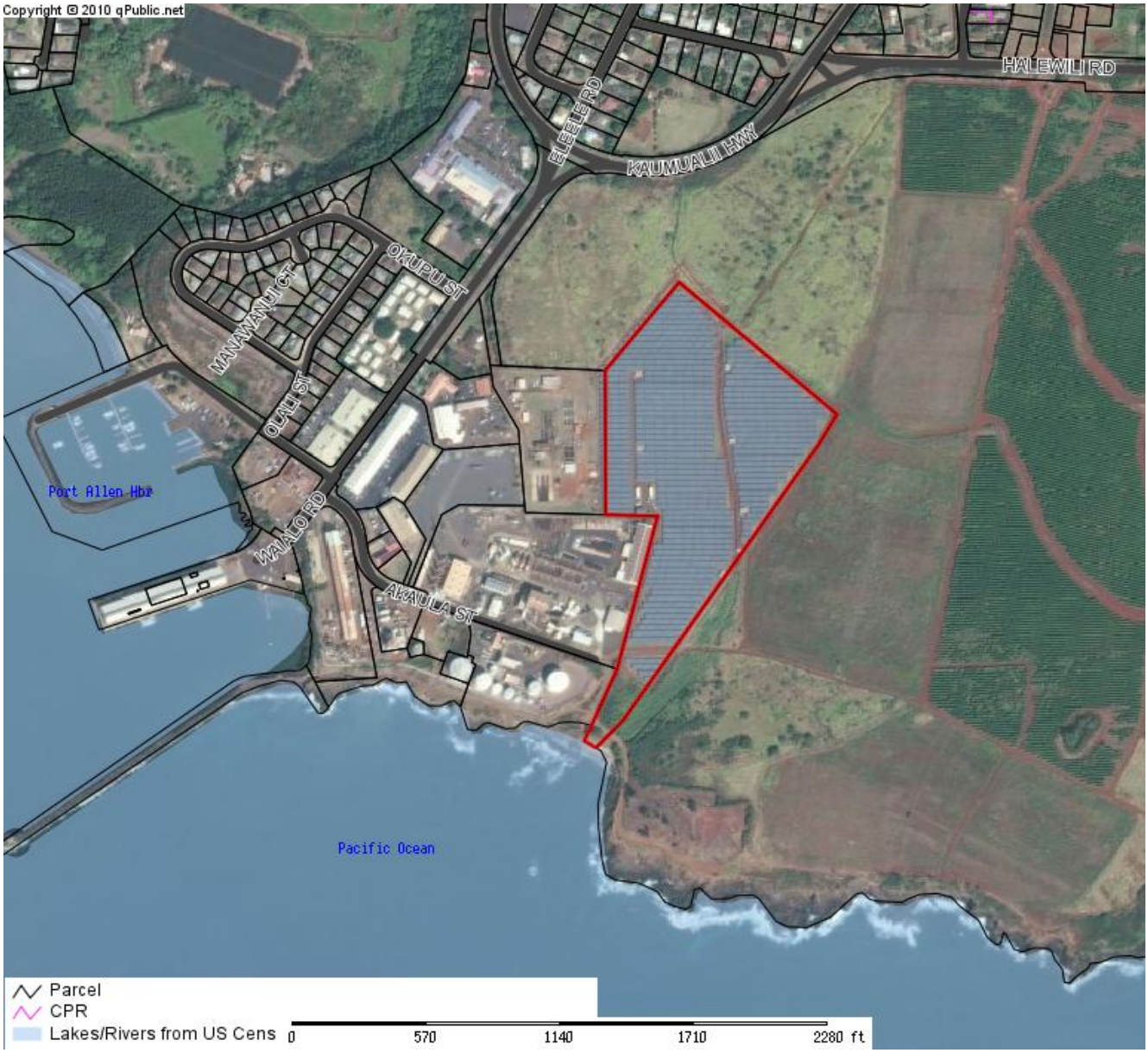
Appendix B2 – Seabird Awareness and Response Training Program (McBryde Facilities)

Appendix C – Standard Operating Procedures

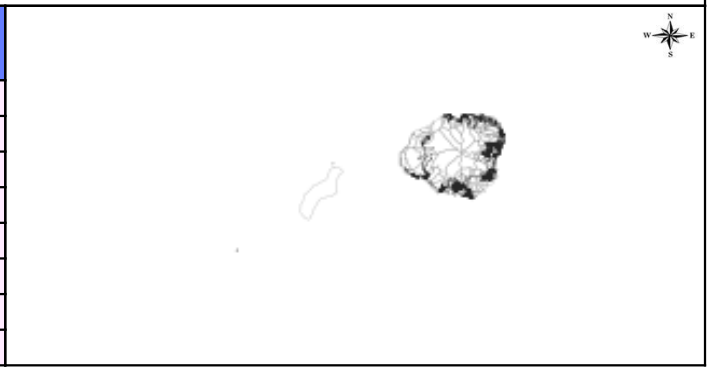
Appendix D – A&B Downed Seabird Recovery Report Form

Appendix A

(a) Port Allen Solar Farm - TMK Map



Port Allen Solar Farm			
Parcel: 210010510000 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 : 05:43:14

(a) Port Allen Solar Farm - Site Plan

Site Plan - Port Allen Solar Farm

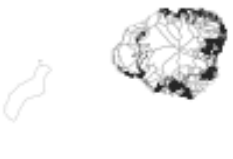
TMK Nos. (4) 2-1-001:051

(a) through (f) Port Allen Commercial Properties – Overview

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)

(b) Port Allen Center I and II - TMK Map

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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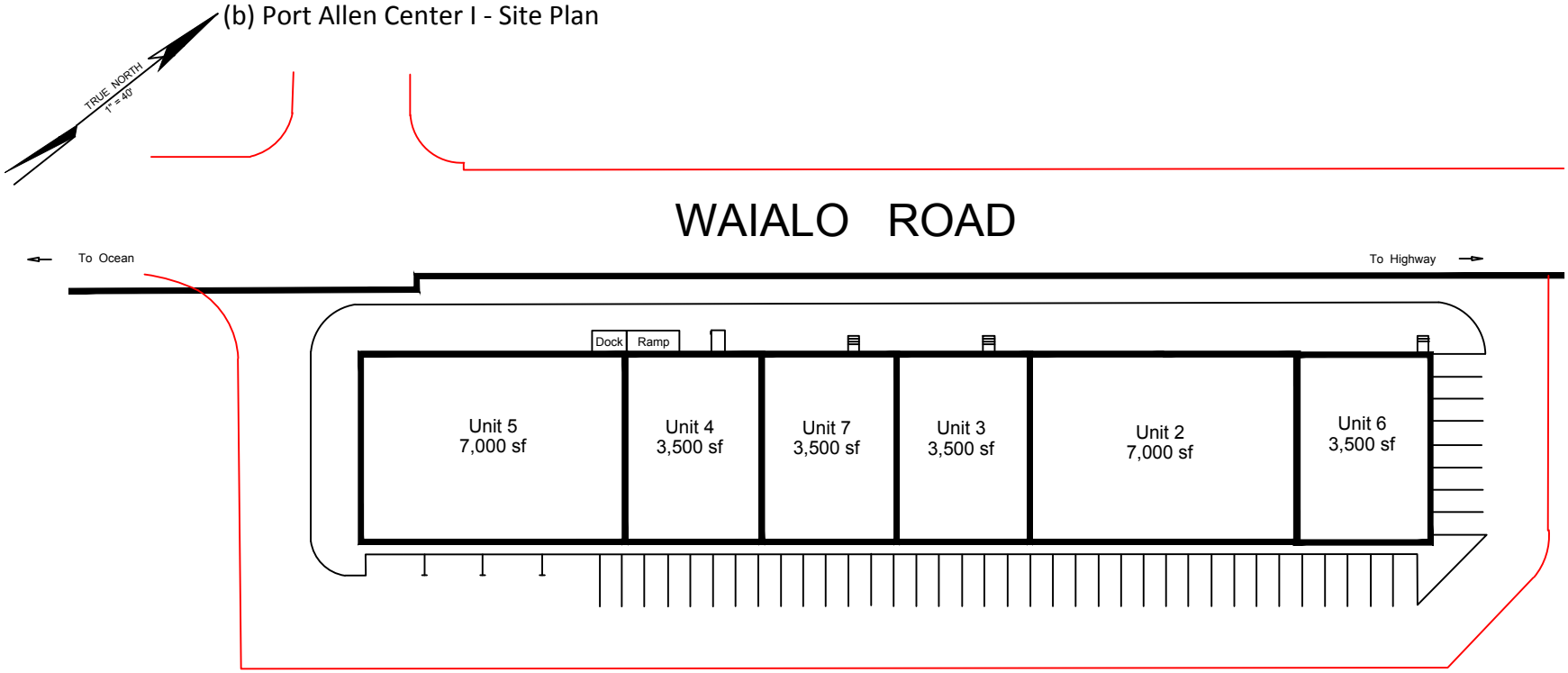
(b) Port Allen Center I and II - Site Plan

Port Allen Center I and II – Site Plan

TMK No. (4) 2-1-003:004

(b) Port Allen Center I - Site Plan



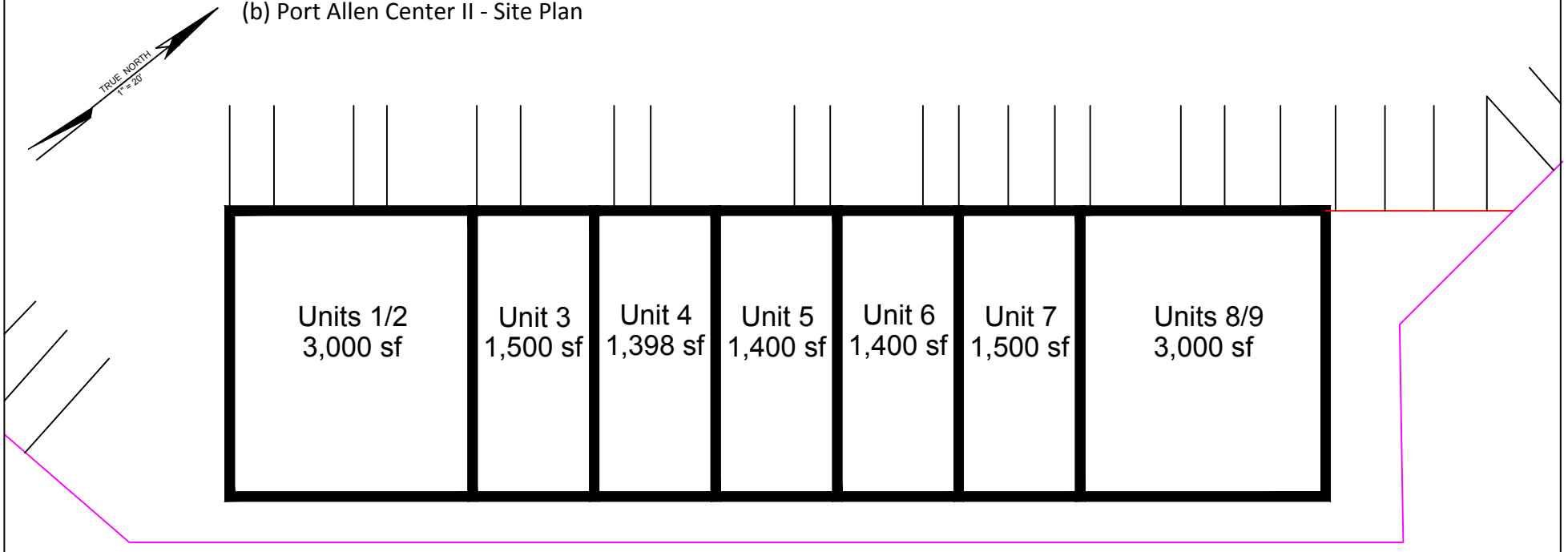
PORT ALLEN CENTER

9-2-2016

Tax Map Key: (4) 2-1-003-004

11" x 17"

(b) Port Allen Center II - Site Plan



PORT ALLEN CENTER 2

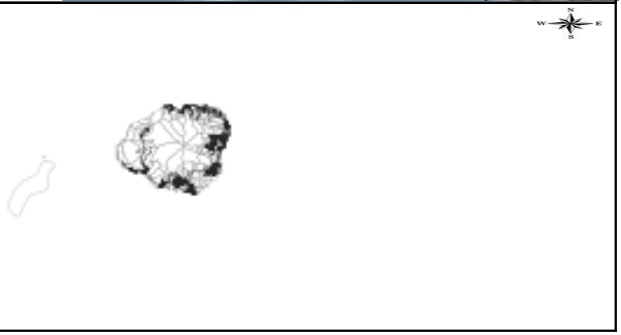
9-29-2014

Tax Map Key: (4) 2-1-003-004

11" x 17"

(c) Port Allen South Parcels - TMK Map (shoreline parcel)

Port Allen Shoreline Parcel			
Parcel: 210030300000 Acres:			
Name:		Land Value	
Site:		Building Value	
Sale:		Misc Value	
Mail:		Just Value	
		Assessed Value	
		Exempt Value	
		Taxable Value	



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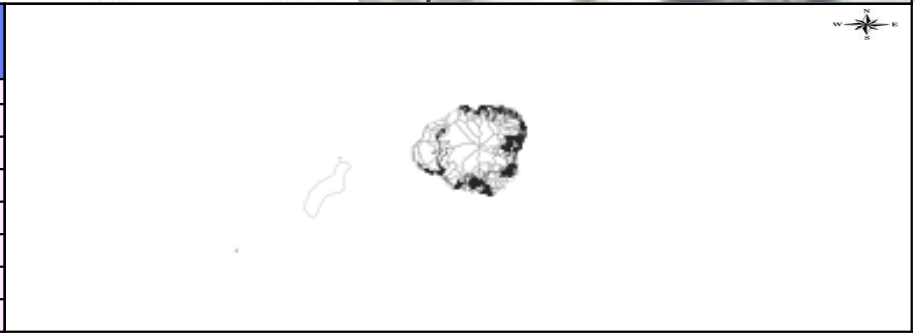
Date printed: 05/16/19 : 05:40:22

(c) Port Allen South Parcels - TMK Map (BEI parcel)

Port Allen BEI Parcel			
Parcel: 210030290000 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 : 05:35:19

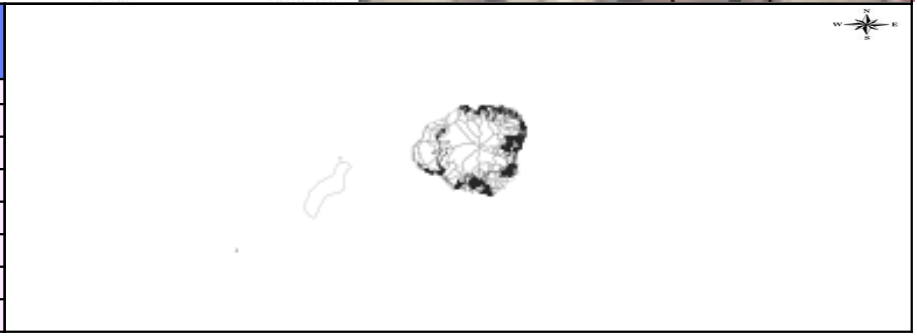
(c) Port Allen South Parcels - Site Plan

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)

(d) Port Allen Parking Lots - TMK Map (Small Parking Lot)

Port Allen small parking lot			
Parcel: 210030250000 Acres:			
Name:		Land Value	
Site:		Building Value	
Sale:		Misc Value	
Mail:		Just Value	
		Assessed Value	
		Exempt Value	
		Taxable Value	



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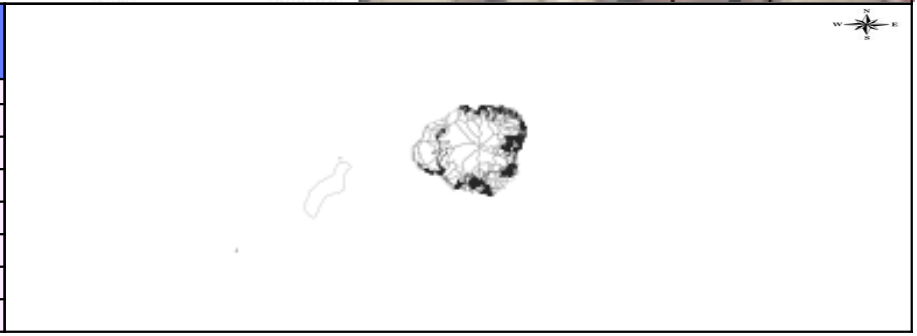
Date printed: 05/16/19 : 05:29:54

(d) Port Allen Parking Lots - TMK Map (Large Parking Lot)

Port Allen large parking lot			
Parcel: 210030260000 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 : 05:30:44

(d) Port Allen Parking Lots - Site Plan

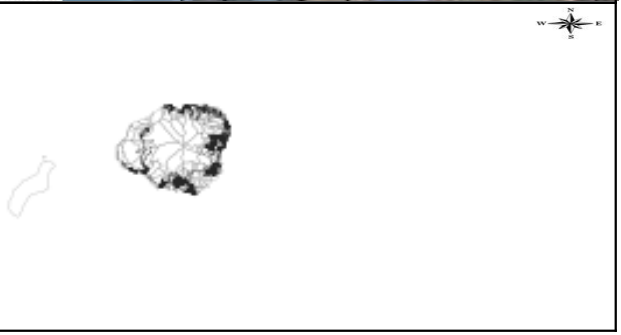
Port Allen Parking Lots – Site Plan

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.

(e) Port Allen Steel Warehouse - TMK Map

Port Allen Steel Warehouse			
Parcel: 210030280000 Acres:			
Name:		Land Value	
Site:		Building Value	
Sale:		Misc Value	
Mail:		Just Value	
		Assessed Value	
		Exempt Value	
		Taxable Value	



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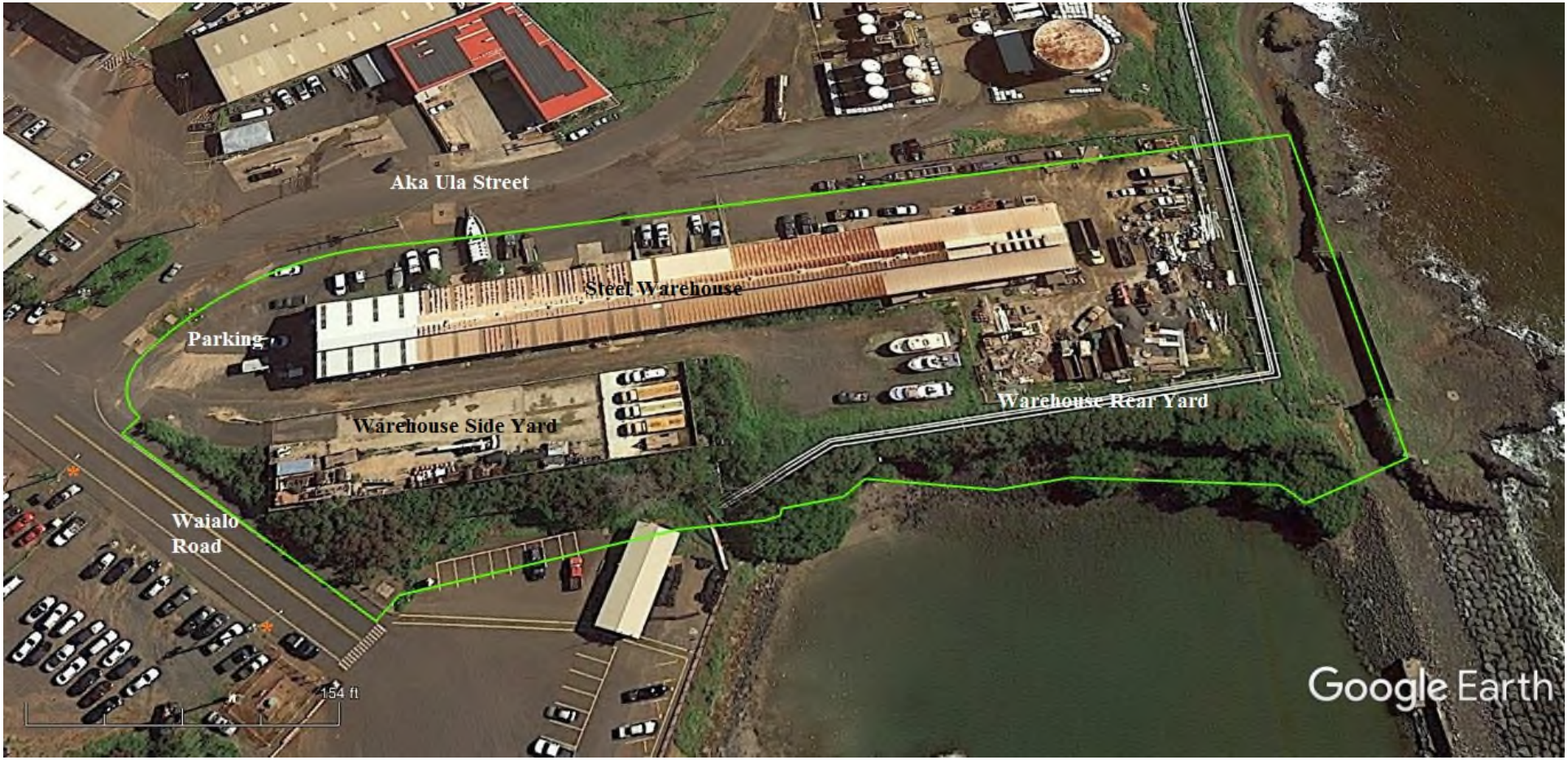
Date printed: 05/16/19 : 05:32:36

(e) Port Allen Steel Warehouse - Site Plan (1 of 2)

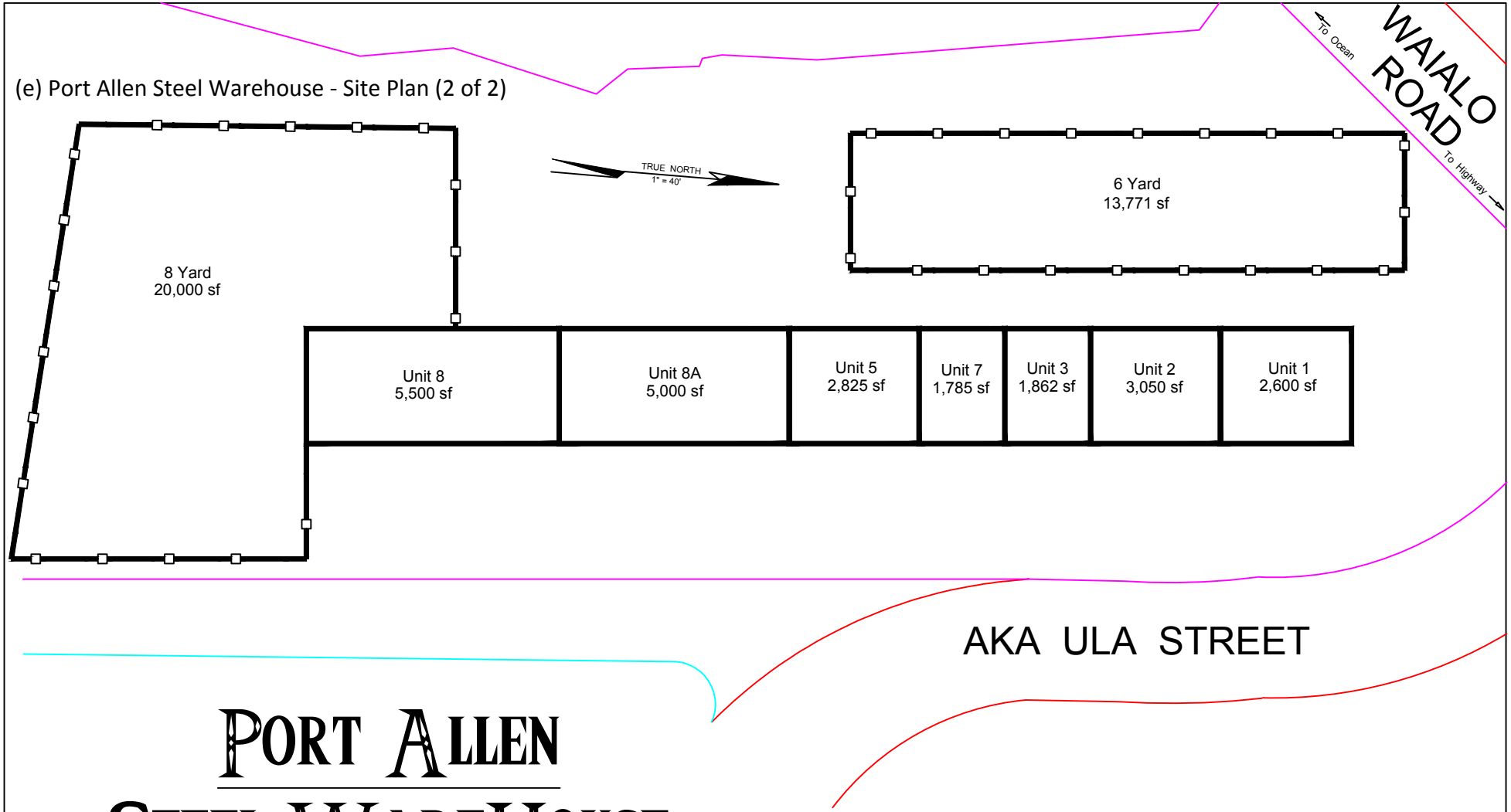


Port Allen Steel Warehouse – Site Plan

TMK No. (4) 2-1-003:028

Note two orange asterisks along Waialo Road denote locations of off-site street lamps.

(e) Port Allen Steel Warehouse - Site Plan (2 of 2)



PORT ALLEN STEEL WAREHOUSE

Lease Expirations

A16

9-2-2016

Tax Map Key: (4) 2-1-003-028

11" x 17"

(f) Port Allen Marina Center - TMK Map

Port Allen Marina Center			
Parcel: 210030400000 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 : 05:34:02

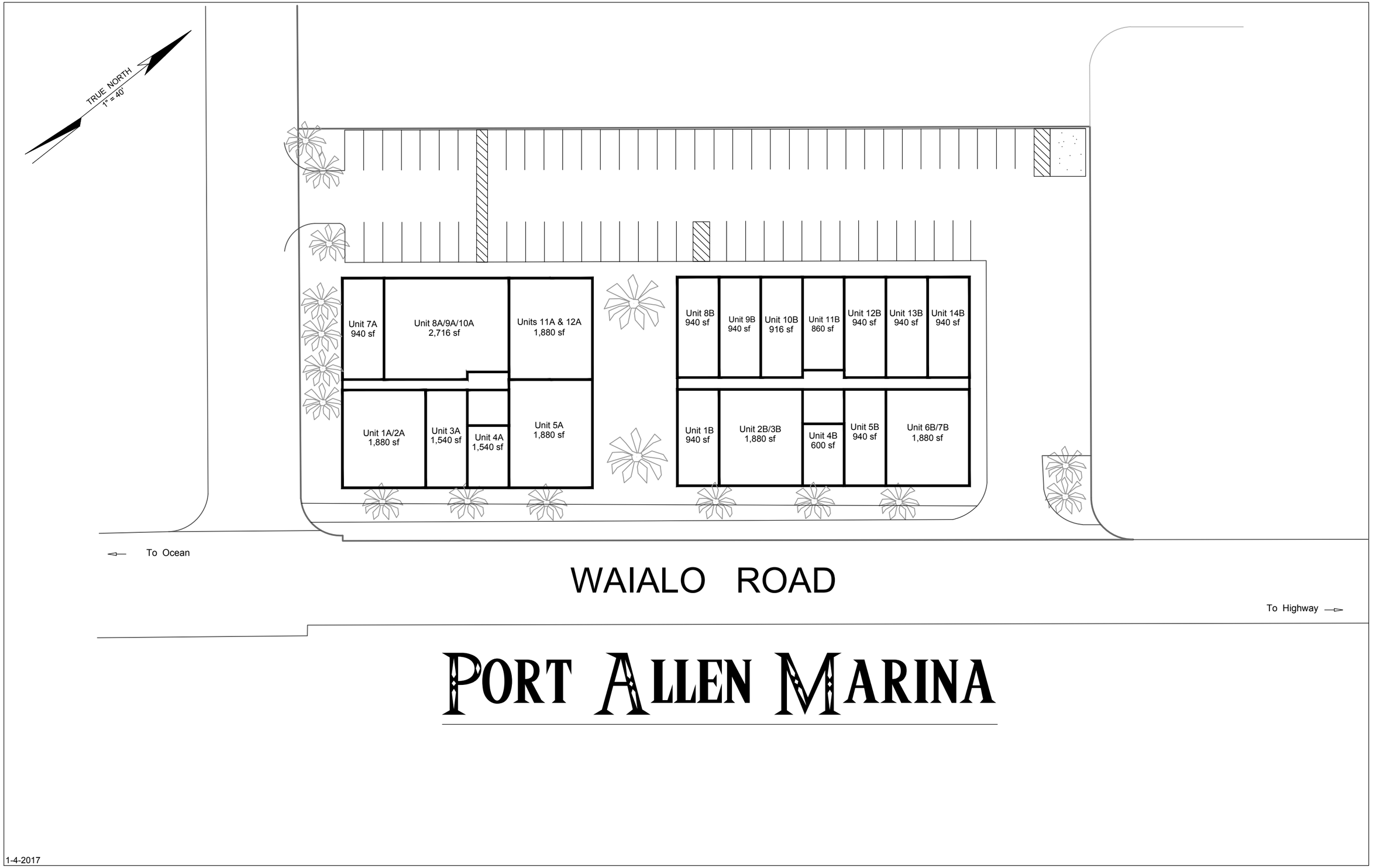
(f) Port Allen Marina Center - Site Plan (1 of 2)

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.

(f) Port Allen Marina Center - Site Plan (2 of 2)

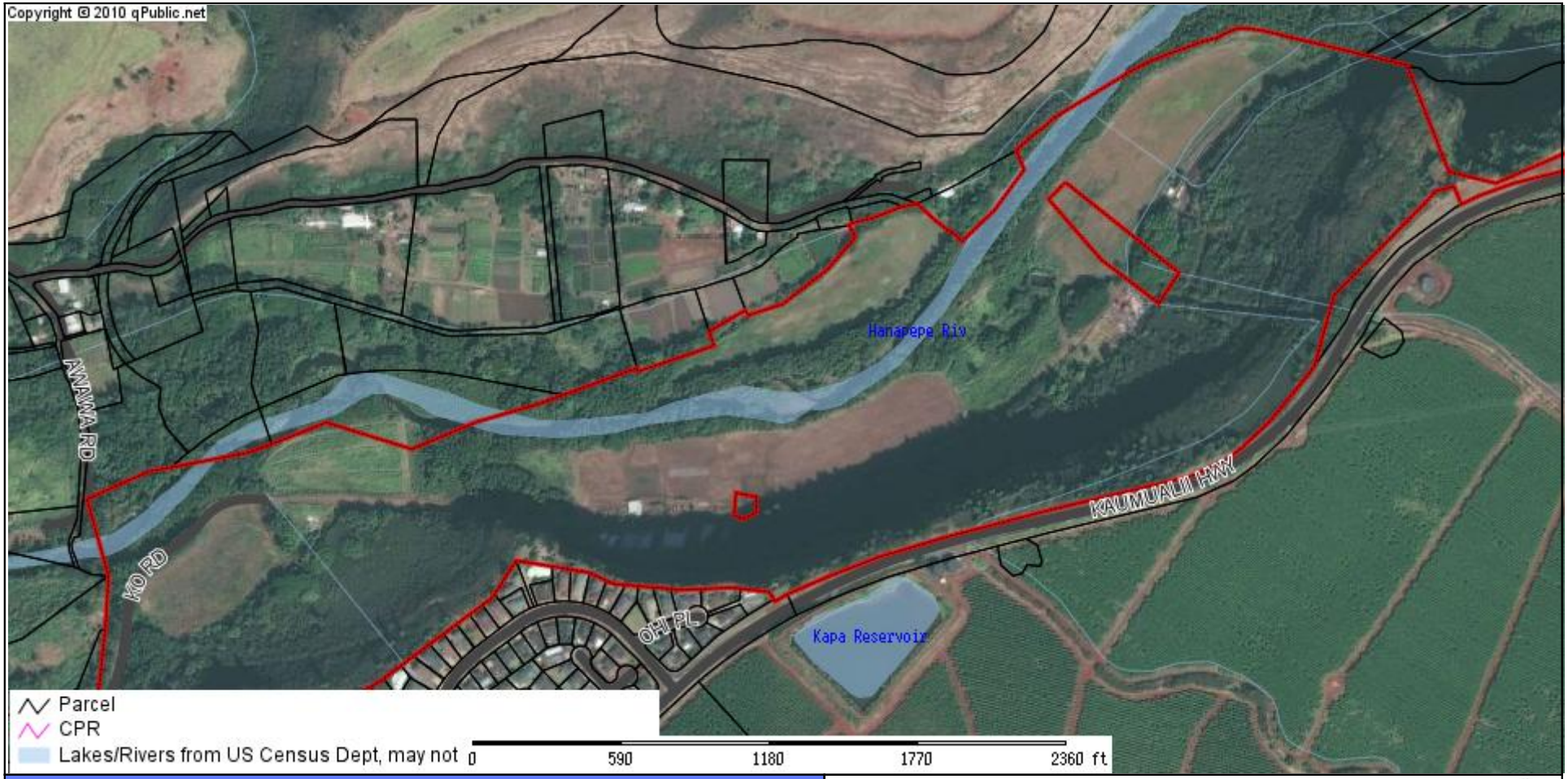


1-4-2017

Tax Map Key: (4) 2-1-003-040

11" x 17"

(g) Pump 3 Hanapepe Valley - TMK Map



Pump 3			
Parcel: 210010100000 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 : 08:04:05

(g) Pump 3 Hanapepe Valley - Site Plan (1 of 2)

Pump 3 Hanapepe Valley Location Map

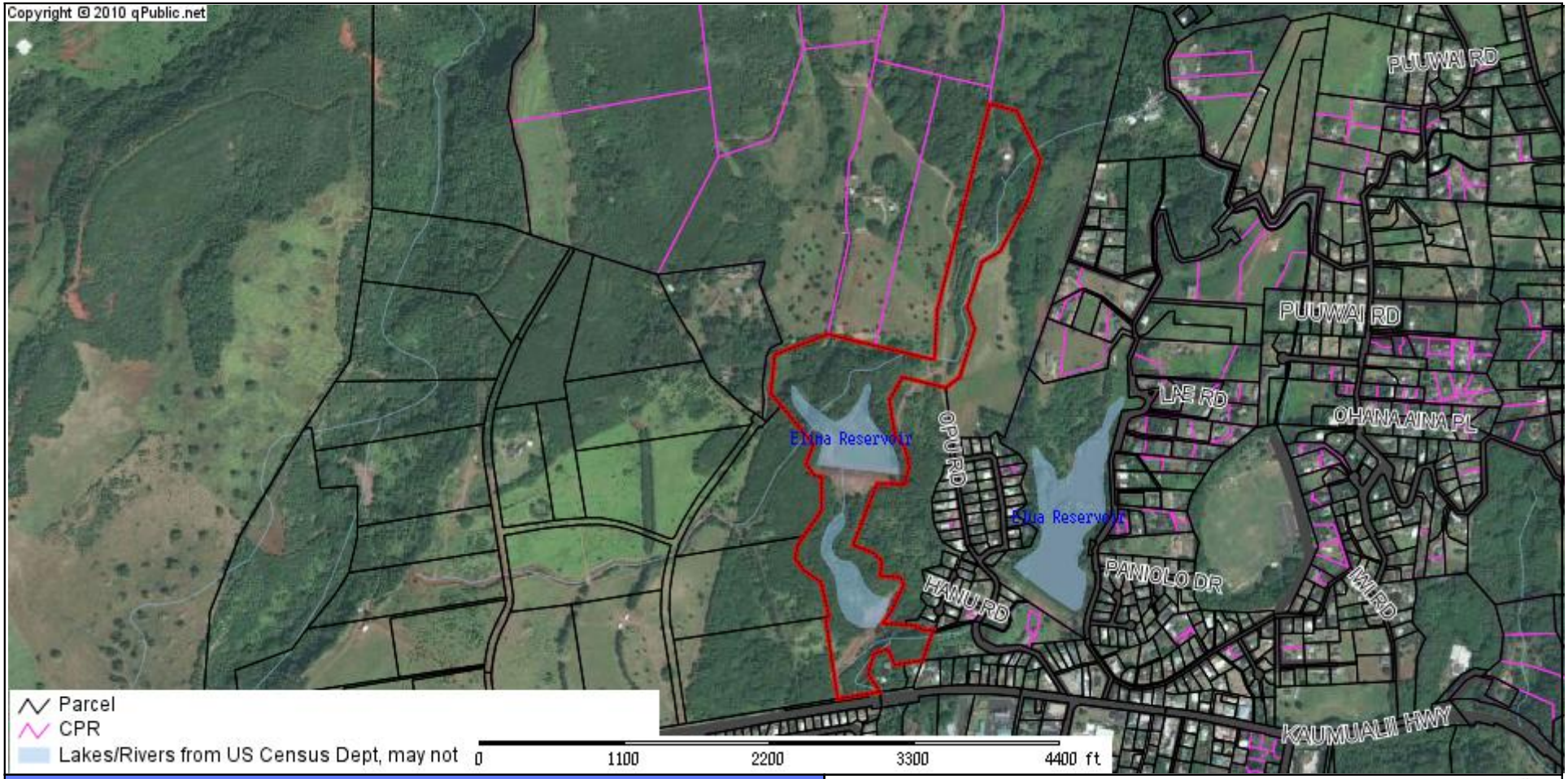
TMK No. (4) 2-1-001:010 (portion)

(g) Pump 3 Hanapepe Valley - Site Plan (2 of 2)

Pump 3 – Site Plan

TMK No. (4) 2-1-001:010 (portion)

(h) Kalaheo Powerhouse - TMK Map



Kalaheo Powerhouse			
Parcel: 240160130000 Acres:			
Name:		Land Value	
Site:		Building Value	
Sale:		Misc Value	
Mail:		Just Value	
		Assessed Value	
		Exempt Value	
		Taxable Value	

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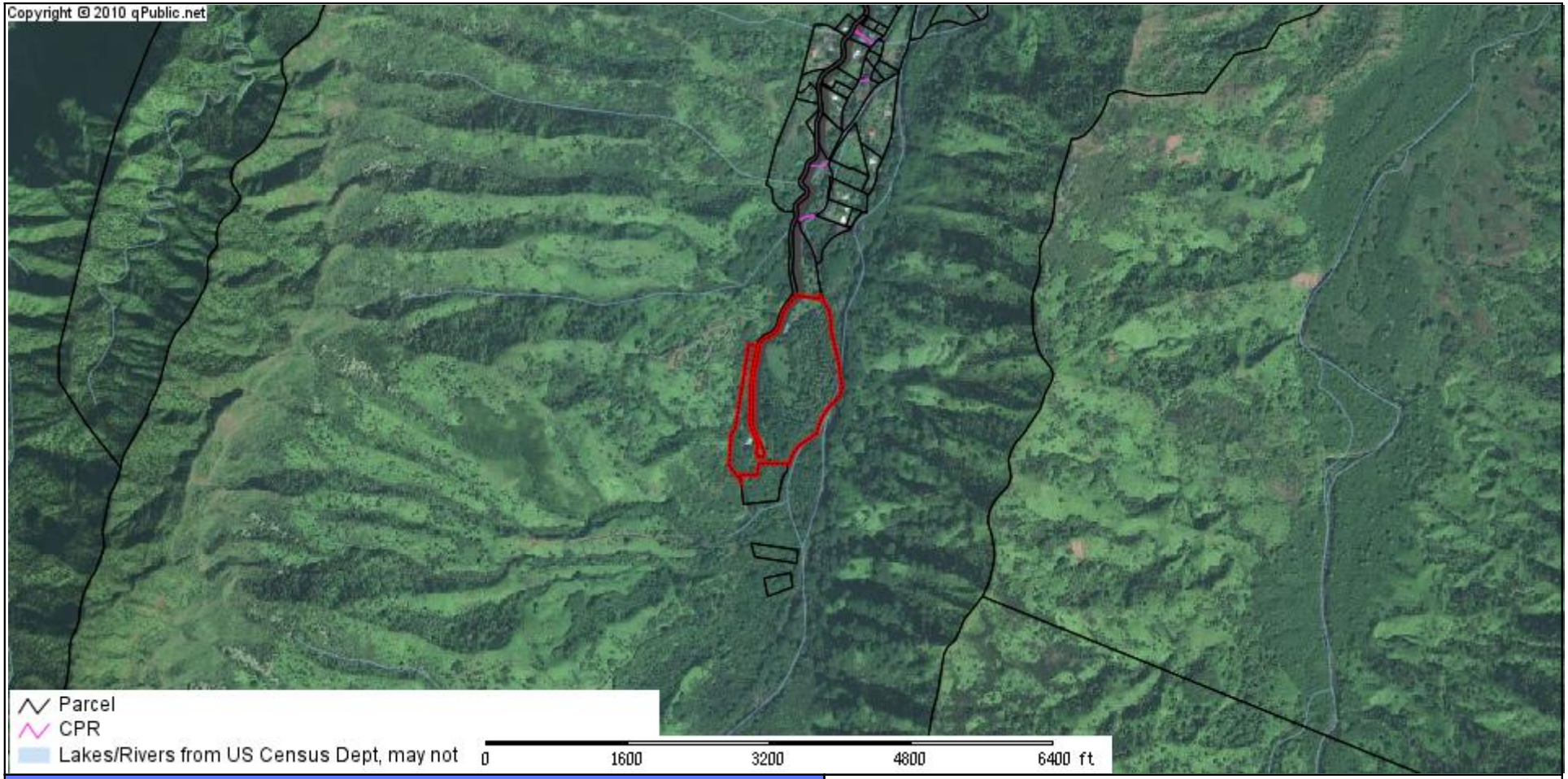
Date printed: 05/16/19 : 08:12:02

(h) Kalaheo Powerhouse - Site Plan

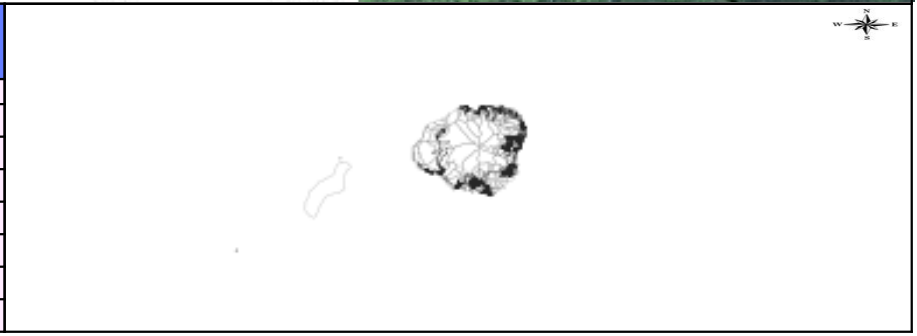
Kalaheo Hydro Powerhouse Site Plan

TMK No. (4) 2-4-016:013 (portion)

(i) Wainiha Powerhouse - TMK Map



Kauai County Assessor			
Parcel: 580030030000 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: 05/28/19 : 03:27:07

(i) Wainiha Powerhouse - Site Plan

Wainiha Hydro Powerhouse Site Plan

TMK No. (4) 5-8-003:003 (portion)

(j) Hokulei Shopping Village - TMK Map (1 of 6)

Hokulei Shopping Village			
Parcel: 330030460000 Acres:			
Name:		Land Value	
Site:		Building Value	
Sale:		Misc Value	
Mail:		Just Value	
		Assessed Value	
		Exempt Value	
		Taxable Value	

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(j) Hokulei Shopping Village - TMK Map (2 of 6)

Hokulei Shopping Village			
Parcel: 330030490000 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 : 06:54:38

(j) Hokulei Shopping Village - TMK Map (3 of 6)

Hokulei Shopping Village			
Parcel: 330030500000 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 : 06:56:23

(j) Hokulei Shopping Village - TMK Map (4 of 6)

Hokulei Shopping Village			
Parcel: 330030510000 Acres:			
Name:		Land Value	
Site:		Building Value	
Sale:		Misc Value	
Mail:		Just Value	
		Assessed Value	
		Exempt Value	
		Taxable Value	

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 : 06:57:18

(j) Hokulei Shopping Village - TMK Map (5 of 6)

Hokulei Shopping Village			
Parcel: 330030520000 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 : 06:58:43

(j) Hokulei Shopping Village - TMK Map (6 of 6)

Hokulei Shopping Village			
Parcel: 330030530000 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 : 06:59:28

(j) Hokulei Shopping Village - Site Plan (1 of 2)

Hokulei Village

4454 Nuhou Street
Lihue, HI 96766

ALEXANDER & BALDWIN
PARTNERS FOR HAWAI'I

Last updated: 1/2/2019

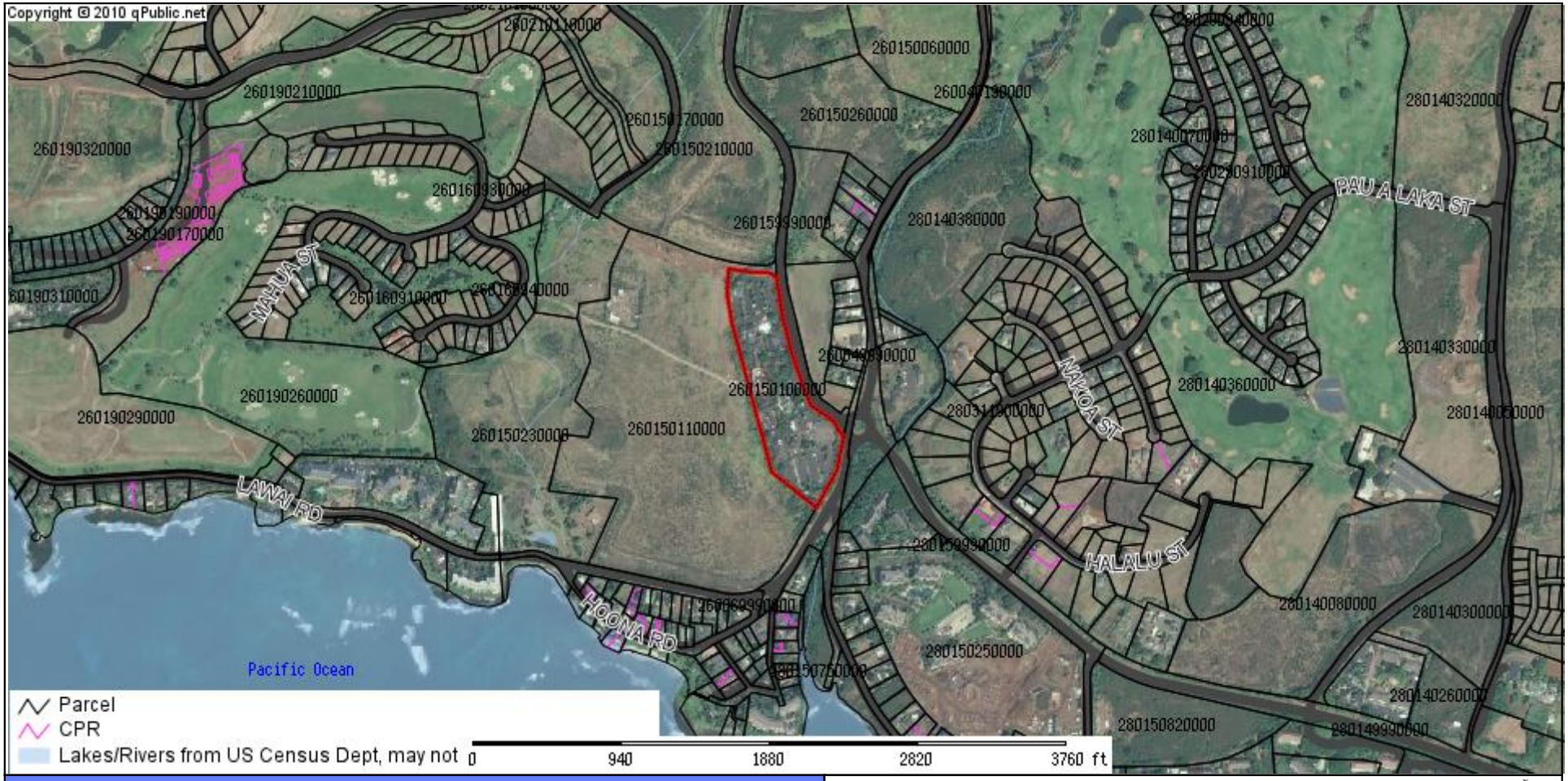
(j) Hokulei Village - Site Plan (2 of 2)

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.

(k) Shops at Kukuiula - TMK Map



Kukuiula Village Shopping Center			
Parcel: 260150100000 Acres:			
Name:		Land Value	
Site:		Building Value	
Sale:		Misc Value	
Mail:		Just Value	
		Assessed Value	
		Exempt Value	
		Taxable Value	

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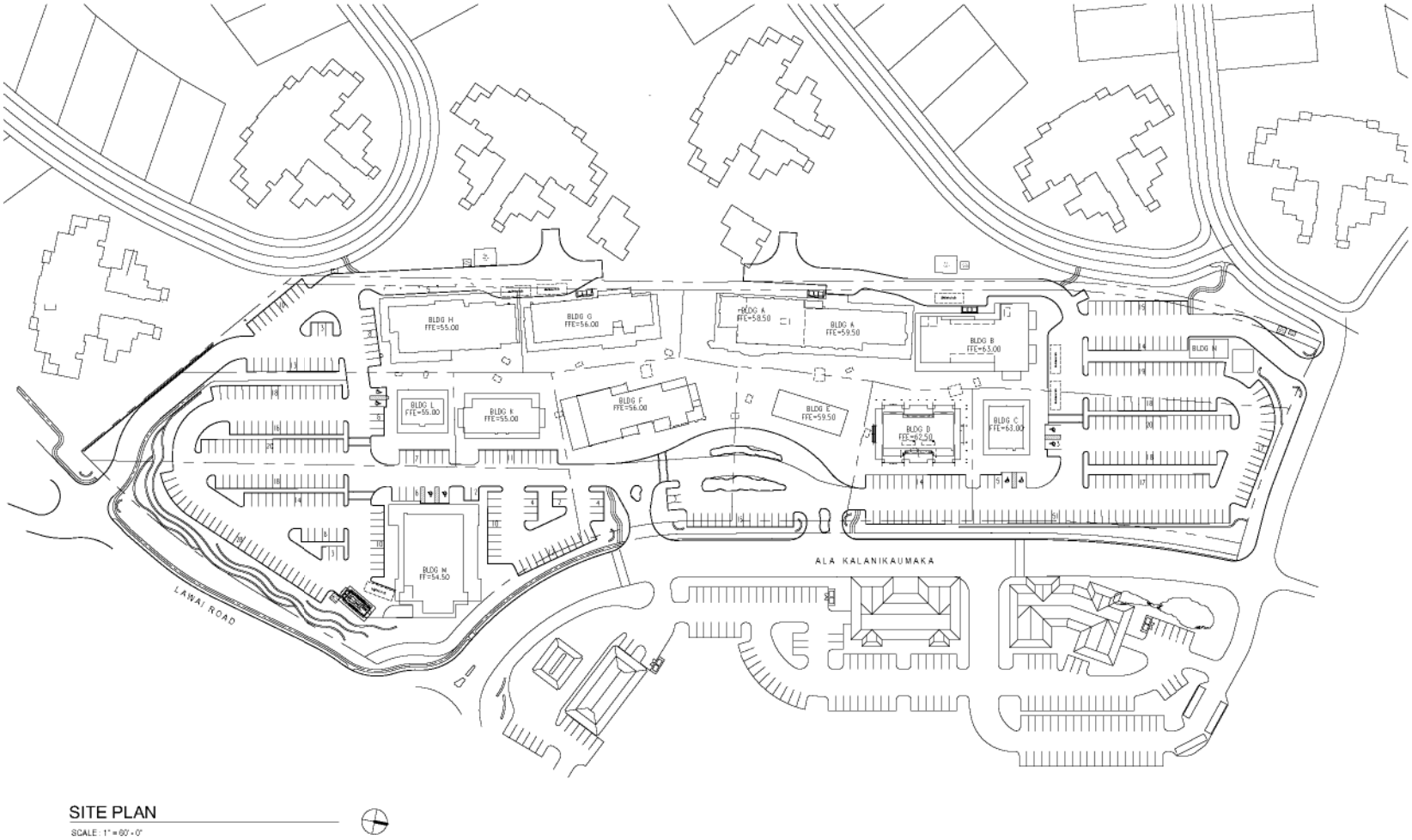
Date printed: 05/15/19 : 22:59:07

(k) Shops at Kukuiula - Site Plan (1 of 2)

The Shops at Kukui'ula Site Plan

TMK No. (4) 2-6-015:010

(k) Shops at Kukuiula - Site Plan (2 of 2)

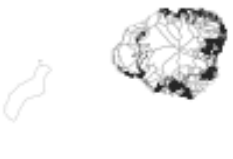


SITE PLAN

SCALE : 1" = 60' - 0"

(l) Waipouli Town Center - TMK Map

Waipouli Town Center			
Parcel: 430080020000 Acres:			
Name:		Land Value	
Site:		Building Value	
Sale:		Misc Value	
Mail:		Just Value	
		Assessed Value	
		Exempt Value	
		Taxable Value	



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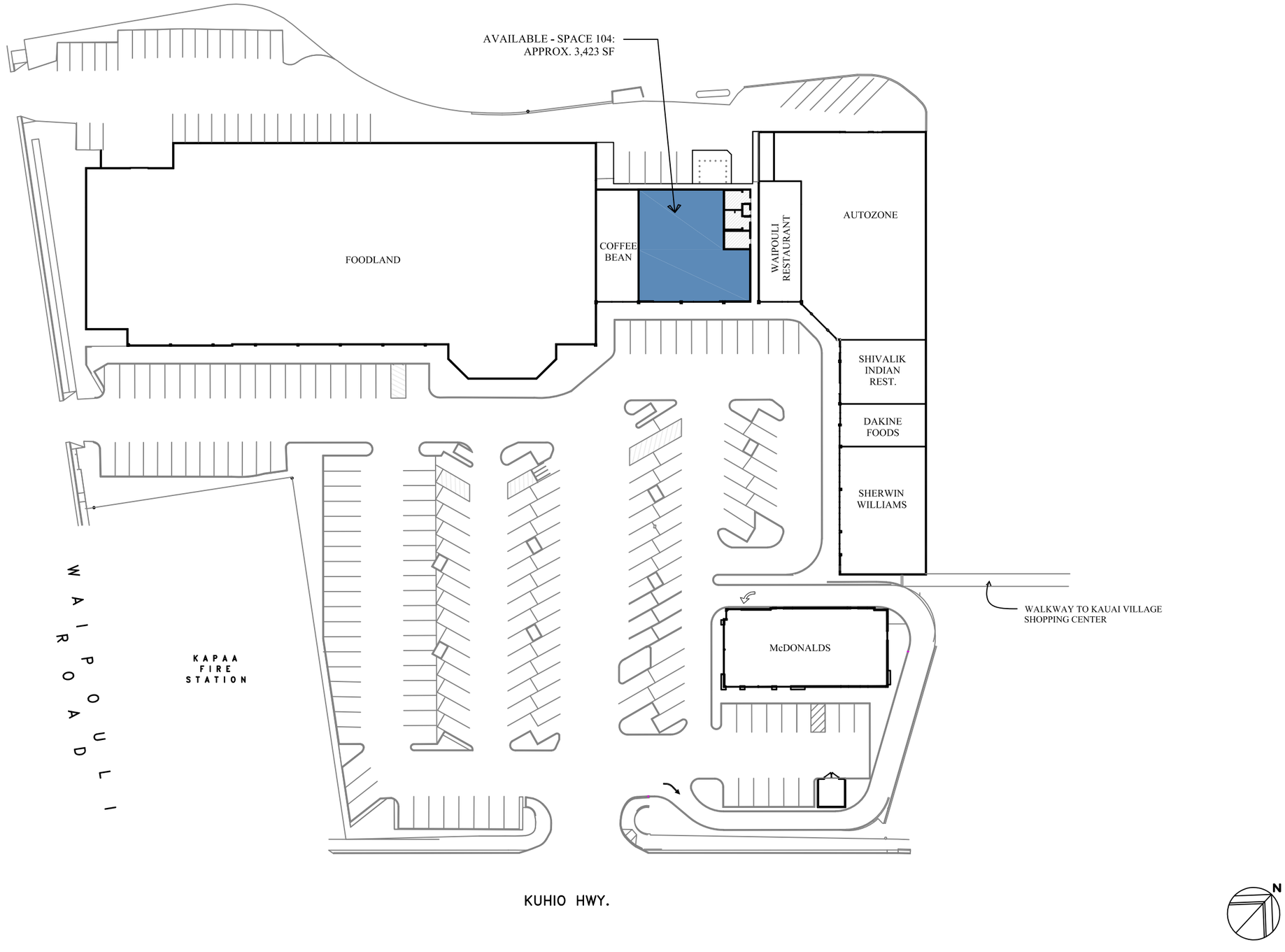
Date printed: 05/16/19 : 05:45:56

Waipouli Town Center (Kapaa) Site Plan

TMK No. (4) 4-3-008:002

(I) Waipouli Town Center - Site Plan (2 of 2)



WAIPOULI TOWN CENTER
4-771 KUHIO HIGHWAY: KAUAI, KAPAA, HAWAII

EXEC. MEETING - DATE: 01.12.18

(m) Kukui'ula Development (Plantation Core/The Club) - TMK Map

Kukui'ula The Club			
Parcel: 260190310000 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: 05/28/19 : 05:28:52

Kukui'ula Development – The Club/Plantation Core Site Plan

TMK No. (4) 2-6-019:031

Appendix B1

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 Kaua‘i 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: davidr003@hawaii.rr.com

Endangered Seabird Species Present on Kaua'i

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

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 Hawaiʻi 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 15theach 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 15th 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. Transfer the bird to the Aid Station and fill out the White Board.
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.

Appendix D

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:

Kaua‘i Seabird Habitat Conservation Program (KSHCP)

Participant Inclusion Plan (PIP)

Name of Applicant/Participant: County of Kaua‘i

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
(808) 241-4455
pporter@kauai.gov

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
(808) 241-4456
wtrugillo@kauai.gov

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.

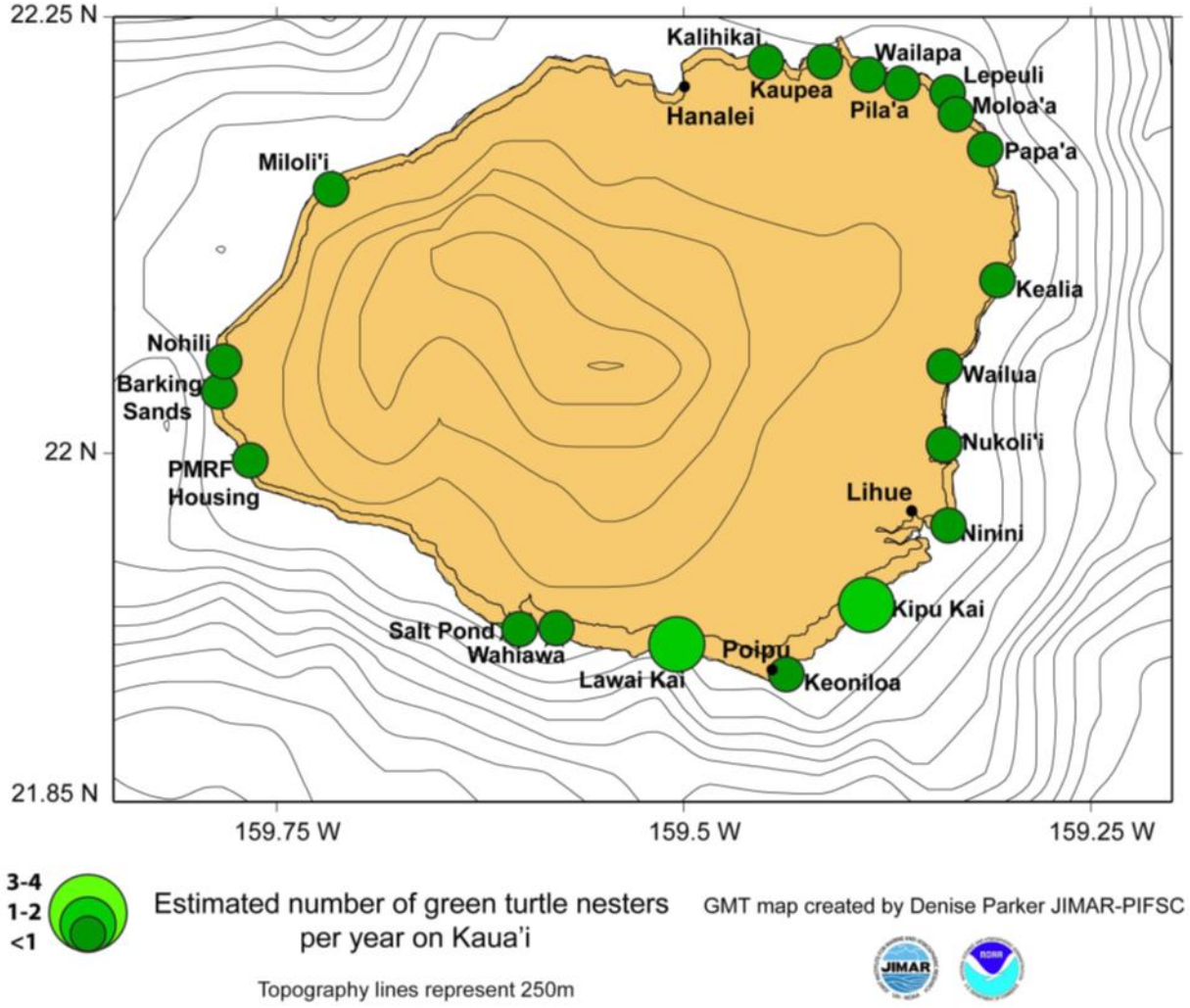
Table 1. Facility Classification

CATEGORY	NO. OF FACILITIES	USAGE
1. Confirmed Unlit Facilities	47	Unlit facilities.
2. Minimal Lighting	17	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.
3. Limited External Lighting	37	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
4. Substantial Exterior Area & Court Lighting	11	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).
5. High-Intensity Stadium & Field Lighting	12	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.
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 (*Chelonian 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



Source: Denise Parker and George Balazs (December 2015), *Map Guide to Marine Turtle Nesting and Basking in the Hawaiian Islands*, page 19.

Table 2. Green turtle (*Chelonia mydas*) nesting locations recorded on Kaua‘i

PLACE NAME	*LATITUDE (N)*	*LONGITUDE (W)*	*MAGNITUDE*	*FREQUENCY*
Lāwa‘i Kai	21° 53.3’	159° 30.1’	1-2	Regular
Wahiawa	21° 53.8’	159° 34.5’	<1	Intermittent
Salt Pond County Beach Park	21° 54.0’	159° 36.4’	<1	Intermittent
PMRF, Pacific Missile Range Facility Housing	21° 59.8’	159° 46.1’	<1	Intermittent
Barking Sands	22° 3.9’	159° 46.9’	<1	Intermittent
Nohili ditch	22° 3.2’	159° 47.0’	<1	Intermittent
Miloli‘i	22° 9.1’	159° 43.1’	<1	Intermittent
Kalihikai	22° 13.6’	159° 26.9’	<1	Intermittent
Kauapea (Secret Beach)	22° 13.4’	159° 24.7’	<1	Unknown
Wailapa	22° 13.0’	159° 23.1’	<1	Unknown
Pila‘a	22° 12.7’	159° 21.9’	<1	Unknown
Lepe‘uli, (Larsen’s Beach)	22° 12.3’	159° 20.3’	<1	Unknown
Moloa‘a	22° 11.6’	159° 20.0’	<1	Unknown
Papa	22° 10.4’	159° 18.8’	<1	Unknown
Keālia	22° 5.9’	159° 18.3’	<1	Unknown
Wailua	22° 3.0’	159° 20.2’	<1	Unknown
Nukoli‘i	22° 0.4’	159° 20.2’	<1	Unknown
Ninini, Nāwiliwili	21° 57.5’	159° 20.3’	<1	Unknown
Kīpū Kai	21° 54.8’	159° 23.6’	1-2	Regular
Keoniloa, Po‘ipū	21° 51.5’	159° 26.3’	<1	Intermittent
Source: Denise Parker and George Balazs (December 2015), *Map Guide to Marine Turtle Nesting and Basking in the Hawaiian Islands*, page 20.				

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 Kaua‘i, 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 3. Green Sea Turtle Assessment

LOCATION	TAX MAP KEY	Light Type	No. Of Lamps	Regular Usage	Frequency of Night Usage	Duration of Night Usage	Observed Nesting?	Observed Basking?	Sandy Shoreline	Risk of Harm
Anahola Beach Park	4-8-014-006	No exterior lights.	0	n/a	None	n/a	No	No	Yes	No. No lights visible from areas suitable for nesting.
Anini Beach Park	5-3-05-05	No exterior lights.	0	n/a	None	n/a	No	No	Yes	No. No lights visible from areas suitable for nesting.
Blackpot Beach Park	5-5-001-004	No exterior lights, but vehicle lights.	0	n/a	None	n/a	No	No	Yes	No. No lights visible from areas suitable for nesting.
Hāʻena Beach Park	5-9-05-19	No exterior lights.	0	n/a	None	n/a	No	No	Yes	No. No lights visible from areas suitable for nesting.
Hanalei Pavilion	5-5-02-19	No exterior lights.	0	n/a	None	n/a	No	Yes	Yes	No. No lights visible from areas suitable for nesting.
Hanamāʻulu Beach Park Pavilion	3-7-03-08	No exterior lights.	0	n/a	None	n/a	No	No	Yes	No. No lights visible from areas suitable for nesting.
Hanapepe River Mouth Open Park Pavilion	1-9-08-07	No exterior lights.	0	n/a	None	n/a	No	No	No	No. No lights visible from areas suitable for nesting.
Kapa'a Beach Park	4-5-11-06	No exterior lights.	0	n/a	None	n/a	No	No	No	No. No lights visible from areas suitable for nesting.
Kapa'a Neighborhood Center	4-5-012-015	HPS Parking Lot Lights, Exterior Security Lights	4	Y	M-F Nights Only	6:00-7:30PM	No	No	No	No. No lights visible from areas suitable for nesting.
Kapa'a Swimming Pool & Bath House	4-5-012-001	4 1000-watt Pool Lights	0	n/a	None	n/a	No	No	No	No. No lights visible from areas suitable for nesting.
Kauai Sands Pump Station	4-3-02-12	No exterior lights.	2	Y	All week	All night	No	No	No	No. No lights visible from areas suitable for nesting.
Lucy Wright Park	1-6-06-01	HPS Parking Lot Lights	2	Y	All week	All night	No	No	No	No. Photo cell activated.

LOCATION	TAX MAP KEY	Light Type	No. Of Lamps	Regular Usage	Frequency of Night Usage	Duration of Night Usage	Observed Nesting?	Observed Basking?	Sandy Shoreline	Risk of Harm
Lydgate	3-9-06-01	100-watt sodium	7	Y	Daily	Dusk to dawn	No	No	No	No. No lights visible from areas suitable for nesting.
Nāwiliwili Park	3-2-04-05	No exterior lights	0	n/a	None	n/a	No	No	No	No. No lights visible from areas suitable for nesting.
Niumalu Park	3-2-02-01	No exterior lights.	0	n/a	None	n/a	No	No	No	No. No lights visible from areas suitable for nesting.
Poʻipū Beach Park	2-8-17-01	No exterior lights.	0	n/a	None	n/a	No	No	No	No. No lights visible from areas suitable for nesting.
Salt Pond Park	1-8-08-43	HPS Parking Lot	6	Y	Upon request.	6:00-10:00 PM	Yes	No	Yes	No. No lights visible from areas suitable for nesting.
Wailua Beach Lifeguard Station (Park)	4-1-04-20	No exterior lights.	6	Y	5-7 days a week	Upon request.	Yes	No	Yes	No. No lights visible from areas suitable for nesting.
Wailua Golf Course	3-9-02-04	7 Mercury Vapor Parking Lot Lights, 2 Mercury Vapor Putting Green Lights, 4 Driving Range Lights, 2 Flood Lamps	0	n/a	None	n/a	No	No	Yes	No
Waiʻoli Town Park	5-5-06-08	8 Metal Halide Lamps	0	n/a	None	n/a	No	No	No	No
Waiʻoli Beach Park	5-5-04-02	No exterior lights.	0	N	None	n/a	No	No	Yes	No

Note 1: Nesting data is from "Map Guide to Marine Turtle Nesting and Basking in the Hawaiian Islands, December 2015, Data mapping product by NOAA-PIFSC Marine Turtle Research Program."

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 Hawai‘i Occupational Safety and Health Program (which implements the Federal Occupational Safety and Health Act of 1970) as they pertain to workplace lighting. The Hawai‘i Department of Labor and Industrial Relations administers the Hawai‘i OSH Law (Chapter 396, H.R.S.) through its Hawai‘i Occupational Safety and Health Division (HIOSH) and has the authority to enforce all laws and standards concerning safety and health at the worksite. HIOSH standards or rules are contained within Title 12, Subtitle 8 of the Hawai‘i 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 4. Proposed Future Facilities and Expansions

Project	*Expected Date of Completion*	*Description*	*Category*
Adolescent Treatment and Healing Center	2019	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.	2
Bryan J. Baptiste Sports Complex Soccer Field	2020	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.	3 or less
Helicopter Hangar	2020	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.)	3
Kapaʻa Armory Building/ Mahelona Hospital Renovation	2020	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.	2
Koaʻe Affordable Housing Development	2020	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.	3
Līhuʻe County Building and Annex (Piʻikoi Office Renovation)	2020	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.	2
Līhuʻe Town Core Mobility Project	2019	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.	2
Līhuʻe Wastewater Treatment Plant Food Waste to Energy Addition	2020	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.	3 or less

Project	***Expected Date of Completion***	***Description***	***Category***
Lima Ola Affordable Housing Development	2021	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.	3
New Landfill Facilities	2023	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.	1 or 2

Item 6. Pursuant to the Endangered Species Act (ESA), Section 10 (a)(2)(A)(iii), describe alternatives to <u>avoid</u> 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

Minimization Measures Considered	Feasible?	If not Feasible, Provide Reason
▪ **Change time of light use (lights off earlier)**	**Yes**	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.
▪ **Deactivate unnecessary lights**	**Yes**	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.
▪ **Replace all outdoor lights with full cut-off fixtures**	**Partial**	The County has done this at all facilities where such lights provide satisfactory lighting.
▪ **Shield all outdoor lights with full cut-off shields**	**Partial**	The County has done this at all facilities where such lights provide satisfactory lighting.
▪ **Angle all lights downward**	**Yes**	The County has done this at all facilities where such lights provide satisfactory lighting.
▪ **Lower intensity (lumens) of outdoor lights**	**Yes**	The County uses the lowest light levels that provide satisfactory performance and do not create unsafe conditions.
▪ **Change bulb color to non-white spectrum**	**Yes**	No colors have been scientifically proven to reduce seabird light attraction in the kinds of light fixtures typically employed by the County.
▪ **Prohibit/control unleashed predatory animals; prohibit outdoor feeding of animals; require sealed rubbish containers**	**Yes**	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.
▪ **Provide Worker Seabird Awareness Training to staff**	**Yes**	The County provides such training.
▪ **Provide outreach materials to staff & guests**	**Yes**	The County provides such materials to staff.
▪ **Host Save Our Shearwaters (SOS) Aid Station**	**Yes**	The County hosts numerous SOS Aid Stations.

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 Wai‘oli 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

Facilities with Lighting Control Systems	*Category*
Anahola Village Park (Basketball Court)	4
Bryan J. Baptiste Sports Complex (formerly known as Kapaʻa New Town Park) (Softball, Tennis Court, Basketball Court, Hockey Rink)	4
Hanapēpē Stadium (Tennis Court)	5
Kalawai Park (Softball field, Tennis Court)	5
Kekaha Faye Park (Softball, Tennis Court, Basketball Court)	5
Kōloa Park Field (Softball, Tennis Court, Basketball Court)	5
Līhu'e County Park (Tennis Court)	4
Vidinha Stadium (Baseball Field)	5
Wailua Homestead Park (Tennis Court)	5
Wailua Houselots Park (Tennis Court)	4
Waimea Canyon Park (Softball, Basketball Court)	5

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

Facilities with Secured Lighting Controls	*Category*
Bryan J. Baptiste Sports Complex (formerly known as Kapaʻa New Town Park) (Stadium)	5
Hanapēpē Stadium (Stadium)	5
Kīlauea Park (Softball Field)	5
Peter Rayno Park (Softball Field)	5
Vidinha Stadium (Stadium)	5

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 fledging 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. <u>Minimization Plans</u>. 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.

KSHCP Options for Monitoring of Take	***Check box (****leave unchecked if not sure)*
Option 1. "Self-monitoring" of take.	☒
Option 2. The DLNR conducts monitoring of take (requires Participant funding & DLNR consultation).	☐

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

1. Confirmed Unlit Facilities	47	Unlit facilities	None	None	None	None	None	New-hire orientation training
2. Minimal Lighting	17	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.	None	None	None	None	None	New-hire orientation training
3. Limited External Lighting	37	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.	If report is received, daily	Only if report is received, weekly	An area up to 10' around the area where downing is reported	A.M. prior to the start of employees shifts.	1	New-hire orientation and annual training
4. Substantial Exterior Area & Court Lighting	11	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).	If report is received, daily	Only if report is received, weekly.	The entire site.	A.M. prior to the start of employees shifts.	1 or 2	New-hire orientation and annual training
5. Stadium & Field Lighting	12	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.	If in use, then when in use: daily	If in use, then weekly.	The entire site.	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.	1 or 2; during the fledgling season, up to 4.	New-hire orientation and annual training

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)*		
Item	***Protocol*** *(fill in protocol & provide reasons)*	***KSHCP Guideline***
Location & description of the beach, or beaches, surveyed and the linear distance of the beach.		*Beach area surveyed should coincide with visibility from the facility with the lights.*
Frequency of searches (# per day or per week)		*Every other day during nesting season (typ. May 15 to end of August)*
Number of searchers per search area		*Depends on site conditions and safety considerations*
Proposed training		*Searchers should receive annual training conducted by the DLNR or the USFWS, or their designee. See* ***item 9a****.*

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)*		
Item	***Protocol*** *(fill in protocol & provide reasons)*	***KSHCP Guideline***
Frequency of searches (# per day or per week)		*Active nests should be monitored every 1-2 days; then daily during expected hatching date*
Light avoidance		*If lights cannot be deactivated or shielded from the nest, each nest should be screened from visible light.*
Number of searchers per search area		*Depends on site conditions and safety considerations*

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 hatchling 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.*
10. *Complete the Bird Take Field Report.*
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

Source: 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. Wala‘au 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 Wala‘au 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.

<u>Estimated Take for Newell's Shearwaters (NESH or 'A'o)</u>

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.

<u>Estimated Average Annual Take for Hawaiian Petrel (HAPE or 'Ua'u)</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.

<u>Estimated Average Annual Take for Band-Rumped Storm Petrel ('Ake'ake)</u>

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.

<u>30-Year Estimated Take</u>

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

	Newell's Shearwater	Hawaiian Petrel	Band-rumped Storm Petrel
Annual average number of downed NESH (5 most recent yrs), HAPE or BRSP (15 most recent years)	4.2	0.5	0.1
Annual observed lethal take estimate (12% of 1, all downed birds)	.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 is 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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List of Attachments

Attachment A List of the facilities (current as of October 31, 2018)
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 Name	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

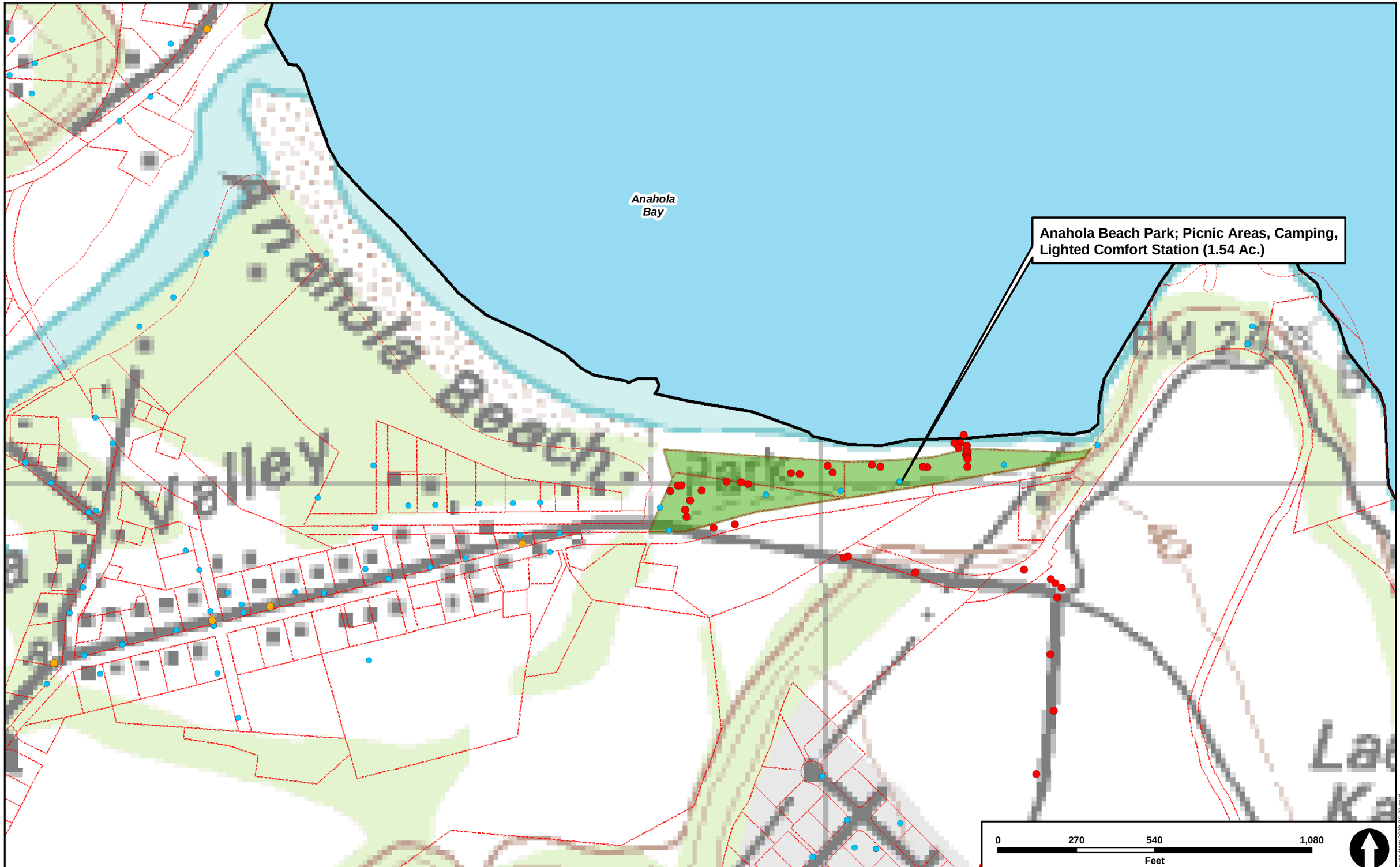
KEALAULA SUBDIVISION BUS STOP	21.903364	-159.586039	LED	2	1	Yes	Daily	Dusk till Dawn	Liability, Safety & Security	Photo-sensor	Already Fully Minimized
KAPAHI FORD MART BUS STOP	22.098676	-159.333942	LED	2	1	Yes	Daily	Dusk till Dawn	Liability, Safety & Security	Photo-sensor	Already Fully Minimized
WAIMEA ATHLETIC FIELD BUS STOP	21.958927	-159.674159	LED	2	1	Yes	Daily	Dusk till Dawn	Liability, Safety & Security	Photo-sensor	Already Fully Minimized
A/C WAIMEA ATHLETIC FIELD BUS STOP	21.958824	-159.674196	LED	2	1	Yes	Daily	Dusk till Dawn	Liability, Safety & Security	Photo-sensor	Already Fully Minimized

LOCATION	TAX MAP KEY	Light Type	Assigned Category	No. of Lamps	Regular Usage	Frequency of Night Usage	Duration of Night Usage	Legal Requirement for Lighting	Notes
ALAWAI ROAD GENERATOR/PUMP STATION	1-6-02-07	No exterior lights	1	0	N	N/A	N/A	N/A	
ANAHOLA BEACH PARK	4-8-14-06	No exterior lights	1	0	N	N/A	N/A	N/A	
ANAHOLA COMMUNICATIONS BUILDING	4-8-03-23	No exterior lights	1	0	N	N/A	N/A	N/A	
ANINI BEACH PARK	5-3-05-05	No exterior lights	1	0	N	N/A	N/A	N/A	
BLACKPOT BEACH PARK	5-5-01-04	No exterior lights	1	0	N	N/A	N/A	N/A	
CAPTAIN COOK PUMP STATION	1-6-07-49	No exterior lights	1	0	N	N/A	N/A	N/A	
ELE'ELE PARK	2-1-04-49	No exterior lights	1	0	N	N/A	N/A	N/A	
FRANCIS CHING PARK	1-6-05-17	No exterior lights	1	0	N	N/A	N/A	N/A	
HAENA BEACH PARK	5-9-05-19	No exterior lights	1	0	N	N/A	N/A	N/A	
HALEHAKA FLARE FACILITY	3-3-03-01	No exterior lights	1	0	N	N/A	N/A	N/A	
HANALEI PAVILION	5-5-02-19	No exterior lights	1	0	N	N/A	N/A	N/A	
HANAMAULU BEACH PARK PAVILION	3-7-03-08	No exterior lights	1	0	N	N/A	N/A	N/A	
HANAPEPE HEIGHTS PARK	1-8-11-23	No exterior lights	1	0	N	N/A	N/A	N/A	
HANAPEPE RIVER MOUTH OPEN PARK PAVILION	1-9-08-07	No exterior lights	1	0	N	N/A	N/A	N/A	
HANAPEPE TOWN PARK	1-9-05-48	No exterior lights	1	0	N	N/A	N/A	N/A	
HANAPEPE VETERAN'S CEMETERY PAVILION	1-8-08-38	No exterior lights	1	0	N	N/A	N/A	N/A	
KALENA PARK	3-6-05-03	No exterior lights	1	0	N	N/A	N/A	N/A	
KALEPA COMMUNICATIONS BUILDING	3-8-02-05	No exterior lights	1	0	N	N/A	N/A	N/A	
KAPA'A BEACH PARK	4-5-11-06	No exterior lights	1	0	N	N/A	N/A	N/A	
KAPA'A CIVIL DEFENSE	4-6-14-30	No exterior lights	1	0	N	N/A	N/A	N/A	
KAPA'A FIRE STATION	4-3-08-09	No exterior lights	1	0	N	N/A	N/A	N/A	
KAPAHI PARK	4-6-11-04	No exterior lights	1	0	N	N/A	N/A	N/A	
KAUAI HUMANE SOCIETY OFFICE AND KENNEL	1-8-08-63	No exterior lights	1	0	N	N/A	N/A	N/A	
KAUAI SANDS PUMP STATION	4-3-02-12	No exterior lights	1	0	N	N/A	N/A	N/A	
KAUMAKANI NEIGHBORHOOD PARK & CENTER	1-7-06-08	No exterior lights	1	0	N	N/A	N/A	N/A	
KILAUEA CIVIL DEFENSE	5-2-04-103	No exterior lights	1	0	N	N/A	N/A	N/A	
KOKEE COMMUNICATIONS BUILDING	1-2-01-09	No exterior lights	1	0	N	N/A	N/A	N/A	
KUKUIOLONO COMMUNICATIONS BUILDING	2-3-05-10	No exterior lights	1	0	N	N/A	N/A	N/A	
KUKUI'ULA LANDING COMFORT	2-6-11-10	No exterior lights	1	0	N	N/A	N/A	N/A	
LIHI PARK	4-5-02-01	No exterior lights	1	0	N	N/A	N/A	N/A	
LIHUE INDUSTRIAL II PUMP STATION/GENERATOR BUILDING	3-5-03-69	No exterior lights	1	0	N	N/A	N/A	N/A	
LIHUE PARK	3-6-02-03	No exterior lights	1	0	N	N/A	N/A	N/A	
MT. KAHILI CIVIL DEFENSE BUILDING	2-4-09-06	No exterior lights	1	0	N	N/A	N/A	N/A	
NĀWILIWILI (MARRIOTT) PUMP STATION/GENERATOR	3-5-02-15	No exterior lights	1	0	N	N/A	N/A	N/A	
NĀWILIWILI PARK	3-2-04-05	No exterior lights	1	0	N	N/A	N/A	N/A	
NIUMALU PARK	3-2-02-01	No exterior lights	1	0	N	N/A	N/A	N/A	
PLANTATION HALE & MOKIHANA/COCONUT BEACH PUMP STATIONS	4-3-02-4	No exterior lights	1	0	N	N/A	N/A	N/A	
POLICE PISTOL RANGE	3-4-06-01	No exterior lights	1	0	N	N/A	N/A	N/A	
POLIHALE CIVIL DEFENSE BUILDING	1-2-02-01	No exterior lights	1	0	N	N/A	N/A	N/A	
PORT ALLEN PUMP STATION	1-9-10-14	No exterior lights	1	0	N	N/A	N/A	N/A	
PRINCE KUHIO PARK	2-6-04-02	No exterior lights	1	0	N	N/A	N/A	N/A	
PUA LOKE PARK - PAVILION	3-6-10-54	No exterior lights	1	0	N	N/A	N/A	N/A	
PUHI PARK PAVILION	3-3-05-08	No exterior lights	1	0	N	N/A	N/A	N/A	
WAIKOMO PARK	2-8-26-01	No exterior lights	1	0	N	N/A	N/A	N/A	
WAILUA BEACH LIFEGUARD STATION (PARK)	4-1-04-20	No exterior lights	1	0	N	N/A	N/A	N/A	
WAI'OLI TOWN PARK	5-5-06-08	No exterior lights	1	0	N	N/A	N/A	N/A	Lighting removed June 2016 due to rotting poles. Replacement TBD./ For illumunating the basketball court
WAOILI BEACH PARK	5-5-04-02	No exterior lights	1	0	N	N/A	N/A	N/A	
ANAHOLA HAWN HOMES PARK	4-8-15-48	Fluorescent Lamps Under roof	2	2	Y	Daily	Dusk To Dawn	Liability, safety & security.	All lights are shielded or under eaves.
COCO PALMS PUMP STATION /GENERATOR BLDG	4-1-03-44	High Pressure Sodium (HPS)	2	1	Y	Daily	Dusk to Dawn	Liability, safety & security.	Light is not functional; timetable for repairs unknown.
HALEKO PUMP STATION GENERATOR BUILDING	3-8-04-14	High Pressure Sodium (HPS)	2	2	Y	No	N/A	N/A	Not connected to power.
HANALEI REFUSE TRANSFER STATION	5-3-01-17	A = 100 watt Fluorescent Flood Lights B = Fluorescent Accent Lights	2	A x 3 B x 1	Flood = Yes Fluorescent = No	Floods are used during evenings only, accent light is used in early mornings when necessary.	Dusk to Dawn	Liability, safety & security.	All flood lights are angled down. Fluorescent accent light is currently not working.
HANAMAULU PUMP STATION / GENERATOR BLDG	3-7-03-12	Wall Mounted Incandescent Bulbs	2	3	N	As needed	As needed	Liability, safety & security.	All lights are under eaves.
HANAPEPE RIVER PUMP STATION	1-9-07-13	Lightpole with incandescent fluorescent	2	1	N	Emergencies only.	N/A	Liability, safety & security.	
KALAHEO NEIGHBORHOOD CENTER	2-3-03-08	A = Parking Lamp B = Fluorescent Lamps	2	A x 1 B x 5	Y	Daily	Dusk To Dawn	Liability, safety & security.	Wall mounted & shielded fluorescent lamps.
KAPA'A PARKS & BEAUTIFICATION BASEYARD	4-5-09-33	100 watt wall mounted security lights	2	6	Y	Daily	As needed	Liability, safety & security.	Light is photo cell activated & mounted under the eaves.
KAPA'A TOWN PUMP STATION	4-5-12-39	High Pressure Sodium (HPS)	2	1	Y	Daily	Dusk To Dawn	Liability, safety & security.	
KAPAIA PUMP STATION/GENERATOR BUILDING	3-8-02-12	Wall Mounted Incandescent Bulbs	2	3	N	As needed	As needed	No	All lights are under eaves.
KEKAHA GARDENS PARK	1-2-02-38	Fluorescent Lamps Under roof	2	2	Y	Daily	Dusk To Dawn	Liability, safety & security.	All lights are shielded or under eaves.
KEKAHA NEIGHBORHOOD CENTER	1-3-01-02	150 watt HPS Parking Lights	2	8	Y	Daily	Dusk To Dawn	Liability, safety & security.	All facility lights are fully shielded.
KOLOA FIRE STATION (NEW)	2-6-04-41	Fluorescent Lamps Under roof	2	2	Y	Daily	Dusk To Dawn	Liability, safety & security.	All lights are shielded or under eaves.
LIHUE FIRE STATION & KALENA PARK	3-6-09-38	Wall Mounted Incandescent Bulbs	2	2	Y	Daily	Dusk To Dawn	Liability, safety & security.	All facility lights are fully shielded.
MENEHUNE ROAD GENERATOR/PUMP STATION	1-6-05-17	100 watt Flood Lights	2	2	N	As needed	As needed	Liability, safety & security.	Only for after hours repairs.
POIPU BEACH PARK	2-8-17-01	Fluorescent Lamps Under roof	2	6	Y	Daily	Dusk To Dawn	Liability, safety & security.	All lights are shielded or under eaves.
WELIWELI PARK	2-8-22-14	Fluorescent Lamps Under roof	2	2	Y	Daily	Dusk To Dawn	Liability, safety & security.	Weliweli Park, 9.00 Acres - Neighborhood Park, Basketball Court, Open Field, Comfort Station
ARZADON INDUSTRIAL PUMP STATION/GENERATOR BLDG	4-3-09-69	High Pressure Sodium (HPS)	3	2	Y	Daily	Dusk to Dawn	Liability, safety & security.	
HANALEI BASEYARD	5-5-03-02	A = 750 watt High Pressure Sodium (HPS) B = Fluorescent T8 32 watt	3	A x 1 B x 2	Y	As Needed	A = 4:00-8:00 AM B = only used during nighttime emergencies.	Liability, safety & security.	Illuminates work area to check equipment
HANALEI COURTHOUSE	5-5-03-02	13 watt LED (Shielded)	3	3	Y	Daily	Dusk To Dawn	Liability, safety & security.	All lights are under eaves and shielded.

LOCATION	TAX MAP KEY	Light Type	Assigned Category	No. of Lamps	Regular Usage	Frequency of Night Usage	Duration of Night Usage	Legal Requirement for Lighting	Notes
HANALEI FIRE AND POLICE	5-4-24-24	A = 9 watt Compact Fluorescent Lights B = 13 watt Compact Fluorescent Lights C = 120 watt Metal Halide Lamps D = T-12 Fluorescent Lamps E = 150 watt Mercury Vapor F = 150 watt High Pressure Sodium Parking Lights	3	A x 16 B x 15 C x 1 D x 4 E x 2 F x 4	A, B, D & F = Y C and E = No	A, B, D & F = Dusk To Dawn C and E = As Needed	Dusk to Dawn	Liability, safety & security.	A and B = under eaves C = for open carport under roof D = 2 under eaves and 2 on open ground for signs E = for gas pump and open patio F = under eaves and angled/shielded
HANAPEPE BASEYARD OFFICE	1-8-08-79	A = 250 watt High Pressure Sodium Flood Lights B = Compact 90 watt fixtures	3	A x 1 B x 50	Y	Daily	A = 4:00 AM and 5:00 AM B = all night	Liability, safety & security.	All lights are under eaves.
HANAPEPE FIRE STATION	1-9-05-47	A = 150 watt HPS Wall Mount B = 9 watt Compact Fluorescent C = 9 watt Compact Fluorescent	3	A x 3 B x 4 C x 3	Y	A and B = Daily C = As needed	A & B = Dusk to Dawn C = As needed	Liability, safety & security.	All lights are under eaves.
HANAPEPE REFUSE TRANSFER STATION	1-8-08-79	A = Facility Lights B = Flood Light	3	A x 3 B x 1	A = No B = Y	B = evenings only	Dusk to Dawn for the floodlight.	Liability, safety & security.	A = bulbs removed and not replaced due to threat to shearwaters. B = angled
KALAHEO FIRE STATION	2-3-03-08	A = 150 watt Height Pressure Sodium Wall Mounts B = 9 watt Compact Fluorescent C = 70 watt High Pressure Sodium	3	A x 4 B x 4 C x 1	A and C = No B = Y	Daily	Dusk to Dawn	Liability, safety & security.	All lights are under eaves.
KALEPA VILLAGE APARTMENTS PHASE I, II, III, & IV	3-8-002:014	A = 70 watt metal halide B = 60 watt incandescent bulb C = 9 watt flourescent bulb D = 40 watt 8" flourescent circulene E = 20 watt 6" flourescent circulene F = 175 watt metal halide G = 13 watt single CFL H = 13 watt double CFL I = 32 watt double CFL J = 90 watt double halagen K = 75 watt halogen L = 70 watt single metal halide M = 75 watt halogen	3	A x 18 B x 22 C x 18 D x 1 E x 2 F x 10 G x 30 H x 28 I x 12 J x 4 K x 5 L x 7 M x 7	Y	Daily	Dusk To Dawn	Liability, safety & security.	A and F = angle and shielded B-E and G-M = under eaves.
KANIKOO ELDERLY HOUSING PHASE I & II	3-6-004:009	A = 1500 lumens pole lights B = 40 watt CFL doorway entrance C = 100 watt LED driveway/sidewalk D = 18 watt LED	3	A x 13 B x 54 C x 24 D x 28	Y	Daily	Dusk To Dawn	Liability, safety & security.	A = angled and shielded B & D = under eaves C = under eaves and luminous at 90 degrees of emplacement (sideway opaque lighting)
KAPA'A NEIGHBORHOOD CENTER	4-5-12-15	A = 150 watt HPS Parking Lights B = Exterior Security Lights	3	A x 6 B x 13	Y	Daily	Dusk To Dawn	Liability, safety & security.	A = shielded B = under eaves
KAPA'A REFUSE TRANSFER STATION	4-6-12-04	150 Watt Fluorescent Floodlight	3	4	Y	Daily	Dusk to Dawn	Liability, safety & security.	All lights are shielded.
KAPA'A SWIMMING POOL & BATH HOUSE	4-5-12-01	1000 watt Pool Lights	3	4	Y	M-F Nights Only	6:00-7:30PM Off During Fledgling Season	Liability, safety & security.	Used for swim practices
KAPA'A TOWN GENERATOR BUILDING	4-5-11-54	High Pressure Sodium (HPS)	3	1	Y	Daily	Dusk to Dawn	Liability, safety & security.	
KAUAI ECONOMIC OPPORTUNITY (KEO)	3-8-005:001	A = 100 watt high pressure sodium B = 175 watt Metal Highlide Lamp C = 32 watt two-lamp flourescent D = 32 watt CFL	3	A x 3 B x 4 C x 4 D x 42	Y	A & B: Daily,	Dusk To Dawn	Liability, safety & security.	A and B = angled and shielded C and D = andgled, shielded, and under eaves
KOA'E WORKFORCE HOUSING DEVELOPMENT	2-6-004:019		3						Proposed Development; lighting associated with the proposed development will not be under County ownership, use, or control.
KOLOPUA WORKFORCE HOUSING APARTMENTS	5-4-024:024	A = 52 watt LED B = 13 watt florescent tube	3	A x 22 B x 85	Y	Daily	A on auto sensor	Liability, safety & security.	A = angled and shielded B = under eaves
LIHUE CIVIC CENTER	3-6-05-27 & 28	A = Compact 13 watt B = HPS 70 watt C = Compact 26 watt D = 75 watt floodlights E = 250 watt HPS Parking Lights F = 32 watt 4-foot VTs G = 100 watt Metal Halide	3	A x 101 B x 20 C x 37 D x 2 E x 32 F x 6 G x 4	Y	Daily	Dusk To Dawn	Liability, safety & security.	All have eaves or roof above them except for parking lights which are angled.
LIHUE COUNTY BUILDING & ANNEX	3-6-05:02 & 03	A = Compact 13 watt B = HPS 70 watt C = Compact 26 watt D = 75 watt floodlights E = 250 watt HPS Parking Lights	3	A x 20 B x 10 C x 15 D x 10 E x 6	Y	Daily	Dusk To Dawn	Liability, safety & security.	All have eaves or roof above them except for parking lights which are angled.
LIHUE NEIGHBORHOOD CENTER (OLD)	3-8-15-24	100 watt Security Lights	3	8	Y	Daily	Dusk to Dawn	Liability, safety & security.	All lights are shielded or under eaves.
LIHUE REFUSE TRANSFER STATION	3-7-02-14	A = Work Bay Lights B = Floodlights	3	A x 6 B x 6	N	Only used during emergency night work.	As needed	Liability, safety & security.	
LIMA OLA WORKFORCE HOUSING DEVELOPMENT	2-1-001:054		3						Proposed Development; lighting associated with the proposed development will not be under County ownership, use, or control.
LUCY WRIGHT PARK	1-6-06-01	Sodium parking lot lights	3	2	Y	Daily	Dusk To Dawn	Liability, safety & security.	All lights are shielded.
LYDGATE PARK	3-9-06-01	150 watt Height Pressure Sodium	3	7	Y	Daily	Dusk to Dawn	Liability, safety & security.	
PAANAU VILLAGE APARTMENTS PHASE I	2-6-004:046	A = 70 watt high pressure sodium B = 60 watt flourescent tube C = 15 watt flourescent bulb	3	A x 18 B x 13 C x 96	Y	A & B: Daily	Dusk To Dawn	Liability, safety & security.	A = angled and shielded B & C = under eaves
PAANAU VILLAGE APARTMENTS PHASE II	2-6-004:046	A = 53 watt LED B = 13 watt compact flourescent C = 26 watt double compact flourescent tube lamp D = 14 watt LED	3	A x 16 B x 6 C x 121 D x 25	Y	A & B: Daily	Dusk To Dawn	Liability, safety & security.	A = angled and shielded; B-D = under eaves

LOCATION	TAX MAP KEY	Light Type	Assigned Category	No. of Lamps	Regular Usage	Frequency of Night Usage	Duration of Night Usage	Legal Requirement for Lighting	Notes
POLICE/EOC/OPA MAIN FACILITY	3-6-02-18	A = 100 watt HPS Parking Lot Lights B = 150 watt HPS Roadway Lights C = 42 watt Recessed Compact Fluorescent Lights D = 70 watt HPS Flood Accent Lights E = 18 watt Compact Fluorescent Wall Sconce F = 70 watt HPS Walkway Bollard G = 32 watt Fluorescent VT Fixtures	3	A x 39 B x 9 C x 18 D x 4 E x 18 F x 24 G x 4	Y	Daily	Parking lights half are on all night, half are on 6:00-10:00PM and again from 4:00Am-6:00AM. The rest are on all night, 6:00PM-6:00AM.	Liability, safety & security.	A and B = angled and shielded. C-G = under eaves.
SALT POND PARK	1-8-08-43	150 watt Height Pressure Sodium	3	6	Y	Daily	Pavilions Upon Request Parking = Dusk To Dawn	Liability, safety & security.	Pavilion lights under eaves. Parking lot lights fully shielded.
SMOKEY VALLEY CLUBHOUSE	1-6-04-12	Flood Lights	3	4	Y	Daily On Motion Sensor	Dusk to Dawn	Liability, safety & security.	
SPOUTING HORN PARK	2-6-03-19	A = Parking Lot lights 100 watt HPS B = under-roof lights Compact 13 watt	3	A x 4 B x 4	Y	Daily	Dusk to Dawn	Liability, safety & security.	
TRANSPORTATION BASEYARD OFFICE	3-3-13-25	A = 50 watt HPS Wall Mount Fixtures B = 150 watt HPS Pole Lights C = 250 watt HPS Pole Lights D 60 watt Incandescent Soffit Mounts	3	A x 5 B x 5 C x 6 D x 6	Y	Daily	Dusk to Dawn	Liability, safety & security.	A = under eaves B and C = angled and shielded D under eaves in recessed soffit
WAIMEA FIRE AND POLICE	1-6-07-48	A = 150 watt High Pressure Sodium Poles Lights B = 9 watt Compact Fluorescent Lamps	3	A x 5 B x 20	Y	Daily	Dusk to Dawn	Liability, safety & security.	B = 9 are under the eaves, 1 is on an open wall.
WAIMEA NEIGHBORHOOD CENTER	1-6-09-23	A = Parking Lot Lights B = Fluorescent Fixtures	3	A x 4 B x 31	Y	Daily	Dusk To Dawn	Liability, safety & security.	
WAIMEA POOL	1-6-09-23	1000 watt Pool Deck Lights	3	4	Y	M-F	6:00-7:30PM Off During Fledgling Season	Liability, safety & security.	Used for swim practice.
WAIMEA TENNIS COURT	1-6-10-05	Fluorescent	3	24	Y	Daily	6:00 PM To 10:00 PM; Off During Fledgling Season	Liability, safety & security.	
WAIMEA THEATRE	1-6-009:008	A = 70 watt metal halide lamp B = 32 watt two-lamp flourescent C = 32 watt flourescent light	3	A x 5 B x 16 C x 12	Y	As needed	As needed	Liability, safety & security.	A = angled and shielded B and C = under eaves C = luminous at 90 degrees emplacement (sideway opaque lighting); light hours not confirmed by operating manager Frequency of night use: only during scheduled movies miscellaneous community events
WAIMEA WASTEWATER TREATMENT PLANT	1-2-06-36	Sodium Lights A, 60 watt Lights B	3	A x 4 B x 2	A = N B = Y	A= Not in use, B = Nightly	A is used only for after hours repairs. B is used 15 hours a day.	Liability, safety & security.	
ANAHOLA VILLAGE PARK	4-8-09-01	1,000 watt Metal Halide	4	5	Y	Daily	6:00 - 10:00 PM Off During Fledgling Season	Liability, safety & security.	Basketball Court (On-Demand By User) Off During Fledgling Season
ELE'ELE WASTEWATER TREATMENT PLANT	2-1-01-43	A = Sodium Parking Lot Lights B = Sodium Flood Lights C = Exterior Wall Fixtures	4	A x 14 B x 4 C x 6	A & B = N C = Y	A & B = Evening Hours C = Daily	A & B = N/A C = All Night	Liability, safety & security.	Parking, Court lighting
KAPA'A NEW BASE YARD	4-5-15-04	A = 9 watt Compact Lights B = 27 watt Compact Lights C = 150 watt HPS Lamps	4	A x 26 B x 3 C x 4	Y	Daily	A & B = 6:00PM-6:00AM C = 4:00AM-5:00AM	Liability, safety & security.	All facility lights are fully shielded.
KAUAI WAR MEMORIAL CONVENTION HALL & OFFICES	3-6-02-09	A = 60 watt Spring Lamps B= 60 watt Spring Lamps C= 25 watt CFL Lamps D= 25 watt CFL Lamps	4	A x 4 B x 22 C x 41 D x 40	Y	A = Daily B = Special Events Only C = Daily D = Evening Hours Events	A = Dusk To Dawn B = 6:00-11:30PM C = Dusk To Dawn D = 6:00-11:30PM	Liability, safety & security.	Building, parking lighting C and D under eaves.
KEKAHA LANDFILL	1-2-02-09	A = 400 watt Sodium Street Lamps B = 50 watt Sodium Recessed Blg. Lights C = 75 watt Incandescent D = HPS Lamps	4	A x 9 B x 5 C x 4 D x 3	A = Dec.- Mar. Mornings, B- D = All Week	Daily	Dusk To Dawn	Liability, safety & security.	All facility lights are fully shielded.
KOLOA NEIGHBORHOOD CENTER	2-8-08-17	A = 150 watt HPS Parking Lights B = Fluorescent Exterior Security Lights	4	A x 5 B x 16	Y	Daily	Dusk To Dawn	Liability, safety & security.	All facility lights are fully shielded.
LIHUE AUTO MAINTENANCE GARAGE/OFFICE	3-8-05-17	Sodium Security Lights	4	5	Y	Daily	Dusk To Dawn	Liability, safety & security.	
LIHUE TENNIS COURT - TENNIS SHELTER	3-6-02-10	1000 watt Incandescent	4	12	Y	Daily	6:00 PM To 10:00PM; Off During Fledgling Season	Liability, safety & security.	Tennis Court (On-Demand By User) Off During Fledgling Season
LIHUE WASTEWATER TREATMENT PLANT	3-5-01-30	A = Sodium Parking Lights B = Sodium Flood Lights C = Fluorescent Lights D = Incandescent Lights	4	A x 19 B x 9 C x 14 D x 17	N	As needed	As needed	Liability, safety & security.	A = light poles B = Shielded C & D = Under eaves.
WAILUA HOUSELOTS PARK	4-1-16-42	A = 100 watt Sodium Lamps B = 1,000 watt Metal Halide	4	A x 4 B x 12	Y	Daily	A = Dusk To Dawn B = 6:00 PM To 10:00 PM; Off During Fledgling Season	Liability, safety & security.	A = parking lots B = tennis courts (On-Demand By User) Off During Fledgling Season
WAILUA WASTEWATER TREATMENT PLANT	3-9-06-19	A = Sodium Parking Lot Lights B = Sodium Flood Lights C = Fluorescent Lights	4	A x 12 B x 2 C x 2	A and C = N B = Y	A and C = evening hours B = Daily	A & C = only during events B = Dusk To Dawn	Liability, safety & security.	
FAYE PARK (KEKAHA)	1-3-02-57	A = 1,000 watt Metal Halide B = 1,500 watt Metal Halide	5	A x 16 B x 24	Y	Daily	6:00 - 10:00 PM; Off During Fledgling Season	Liability, safety & security.	Basketball Court & Tennis Court (On-Demand By User) Softball Field (By Permit, On-Demand By User) Off During Fledgling Season
HANAPEPE STADIUM	1-9-09-01	A = 1,000 watt Metal Halide B = 1,500 watt Metal Halide	5	A x 16 B x 46	Y	Daily	6:00 PM To 10:00 PM; Off During Fledgling Season	Liability, safety & security.	Tennis Court (On-Demand By User) Field (By Permit) Off During Fledgling Season

LOCATION	TAX MAP KEY	Light Type	Assigned Category	No. of Lamps	Regular Usage	Frequency of Night Usage	Duration of Night Usage	Legal Requirement for Lighting	Notes
ISENBERG PARK	3-8-15-24	1,500 watt Metal Halide	5	40	Y	Daily	6:00 PM To 10:00 PM; Off During Fledgling Season	Liability, safety & security.	Basketball Court (On-Demand By User) Softball Field (By Permit, On-Demand By User) Off During Fledgling Season



Kilauea Park 2008-06-20.mxd

Facility Name:

Anahola Beach Park

Facility Type:

Beach Park

Size:

Unknown

TMK Parcel No.:

4-8-14:06

Facility Lighting:

Yes

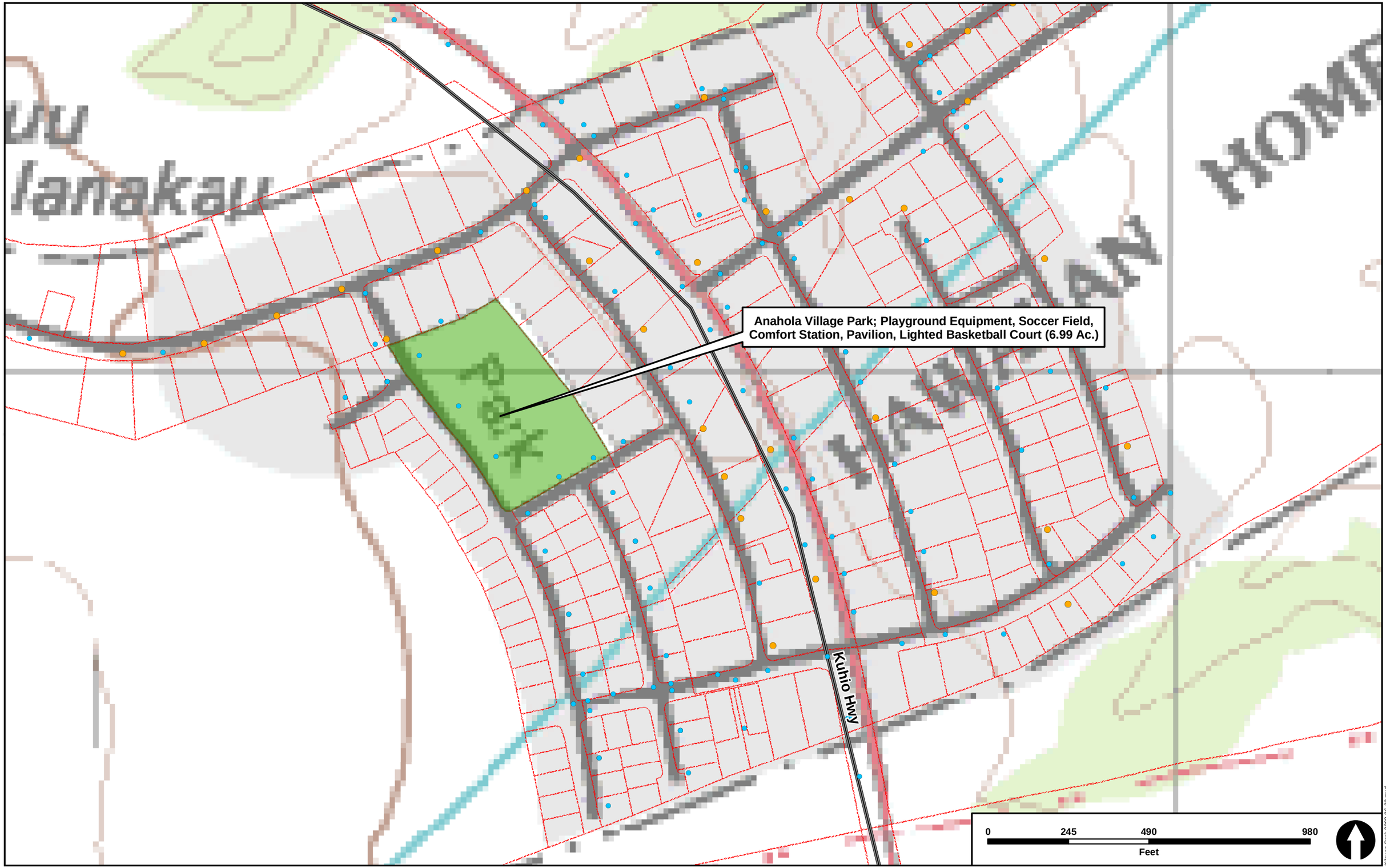
Lighting Controls:

Manual

Lighting Information:

-The comfort station is lit by interior and exterior fluorescent lights.

Anahola Beach Park Facility Sheet 2008-07-29.cdr



Kilauea Park 2008-06-20.mxd

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.

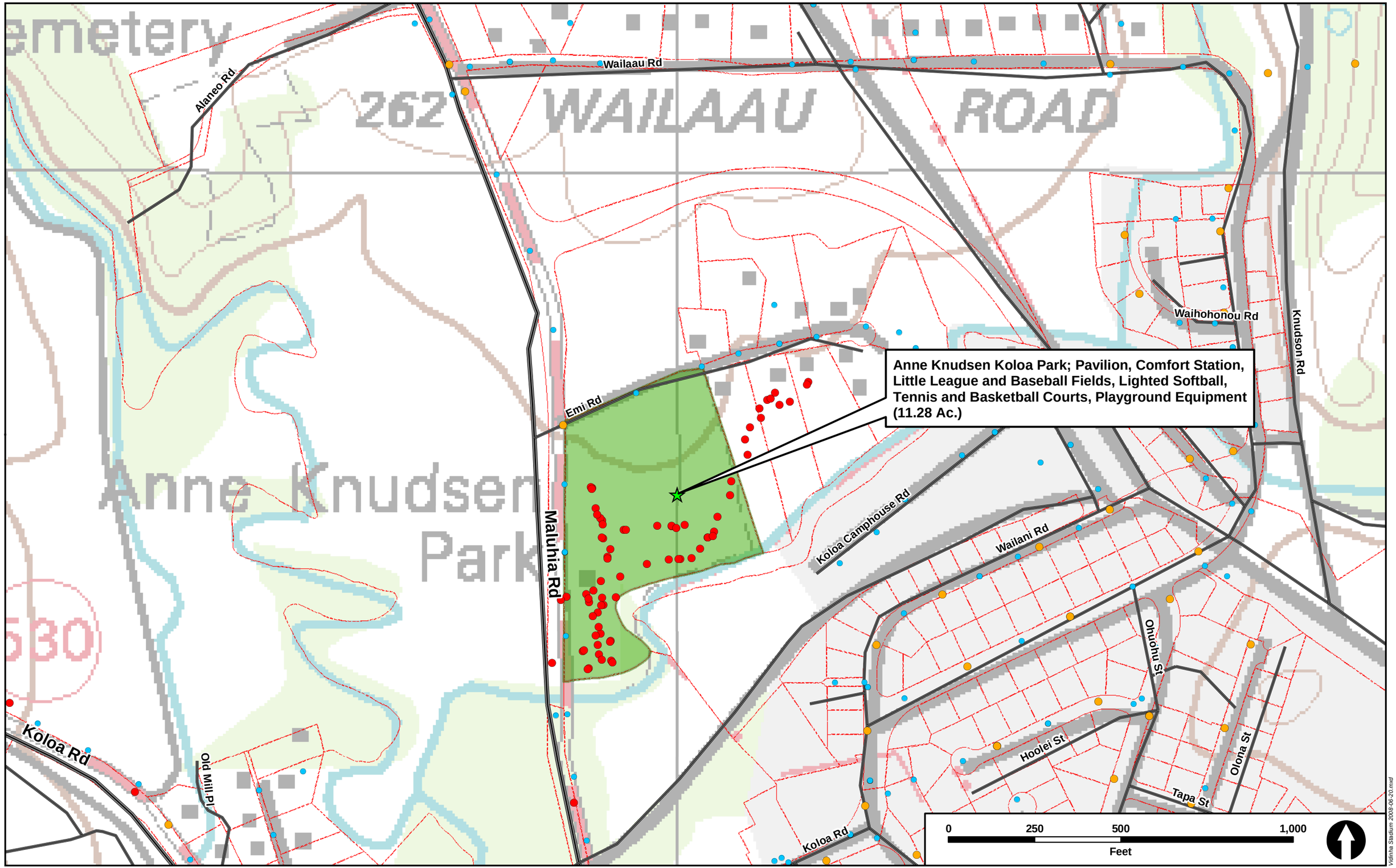
Lighting Information:

-Pavilion and comfort station have external and internal fluorescent lighting.

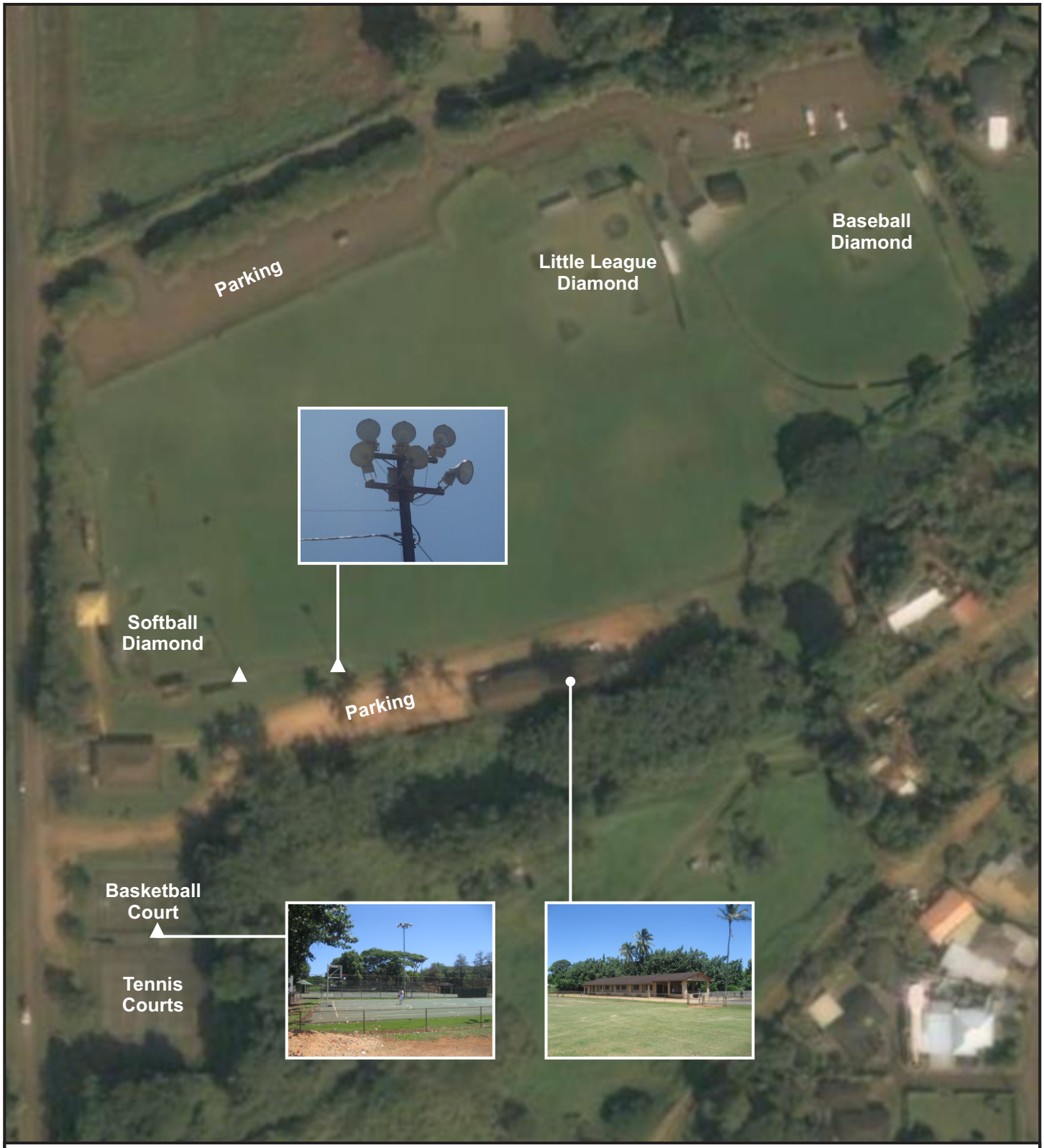
-Basketball court has two poles with two fixtures each; all are shielded.

-Play field and playground are unlit.

Anahola Village Park Facility Sheet 2016-08-02.cdr



Vidinha Stadium 2008-06-20.mxd



Facility Name:

Anne Knudsen Koloa Park

Facility Type:

District Park (Type II)

Size:

11.28 Acres

TMK Parcel No.:

2-8-05:04, 2-8-05:17, 18, & 19

Facility Lighting:

Yes

Lighting Controls:

-Tennis and basketball programmed online.
-Softball programmed online by permit.

Lighting Information:

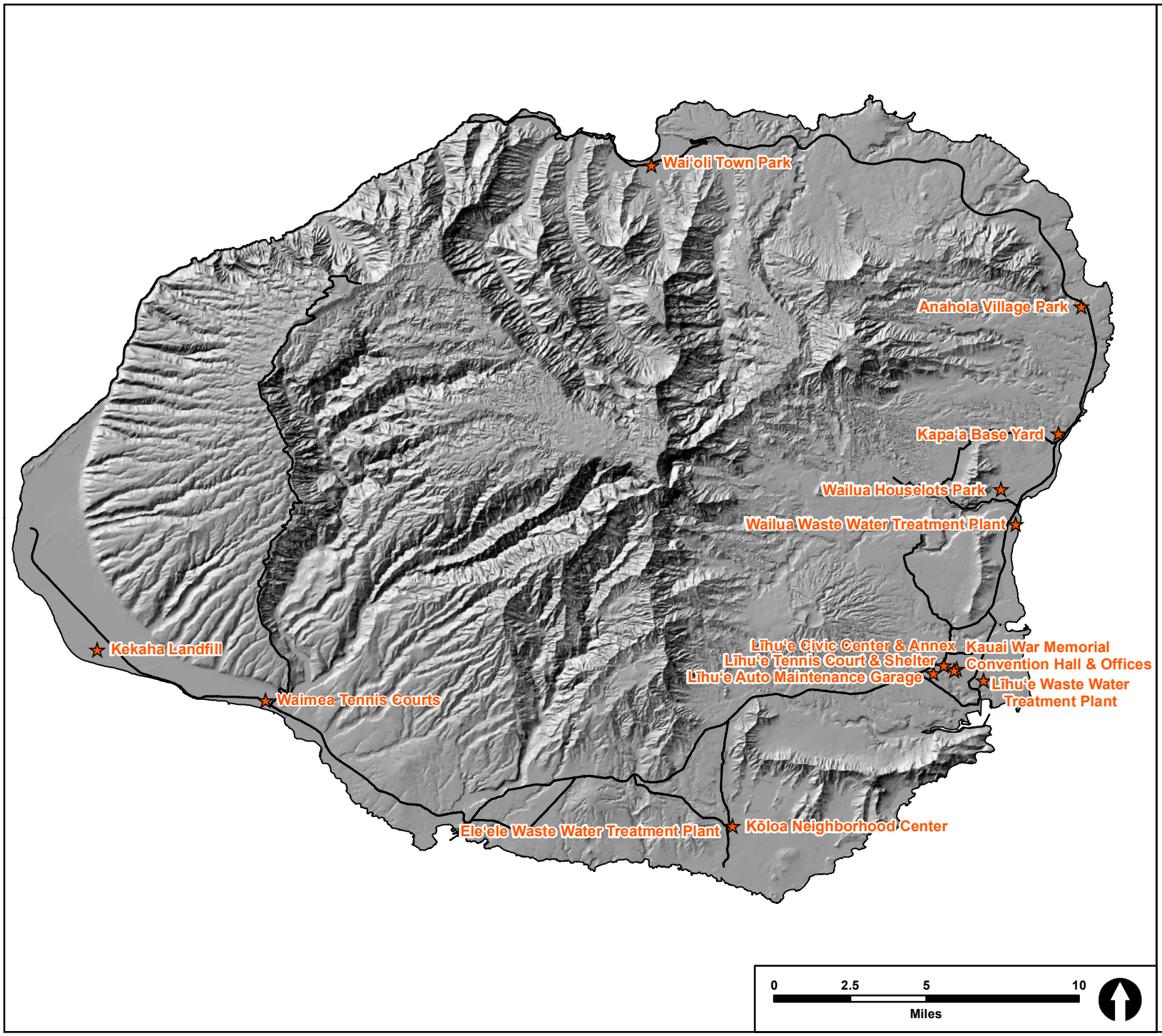
-Baseball diamond is lit by 6 poles with 3-5 floodlights each.

-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.

Anne Knudsen Koloa Park Facility Sheet 2016-08-02.cdr



Legend:

County Facilities in Category 4: Exterior Area & Court Lights

Prepared For:

County of Kauai

Prepared By:

PLANNING SOLUTIONS

Source::

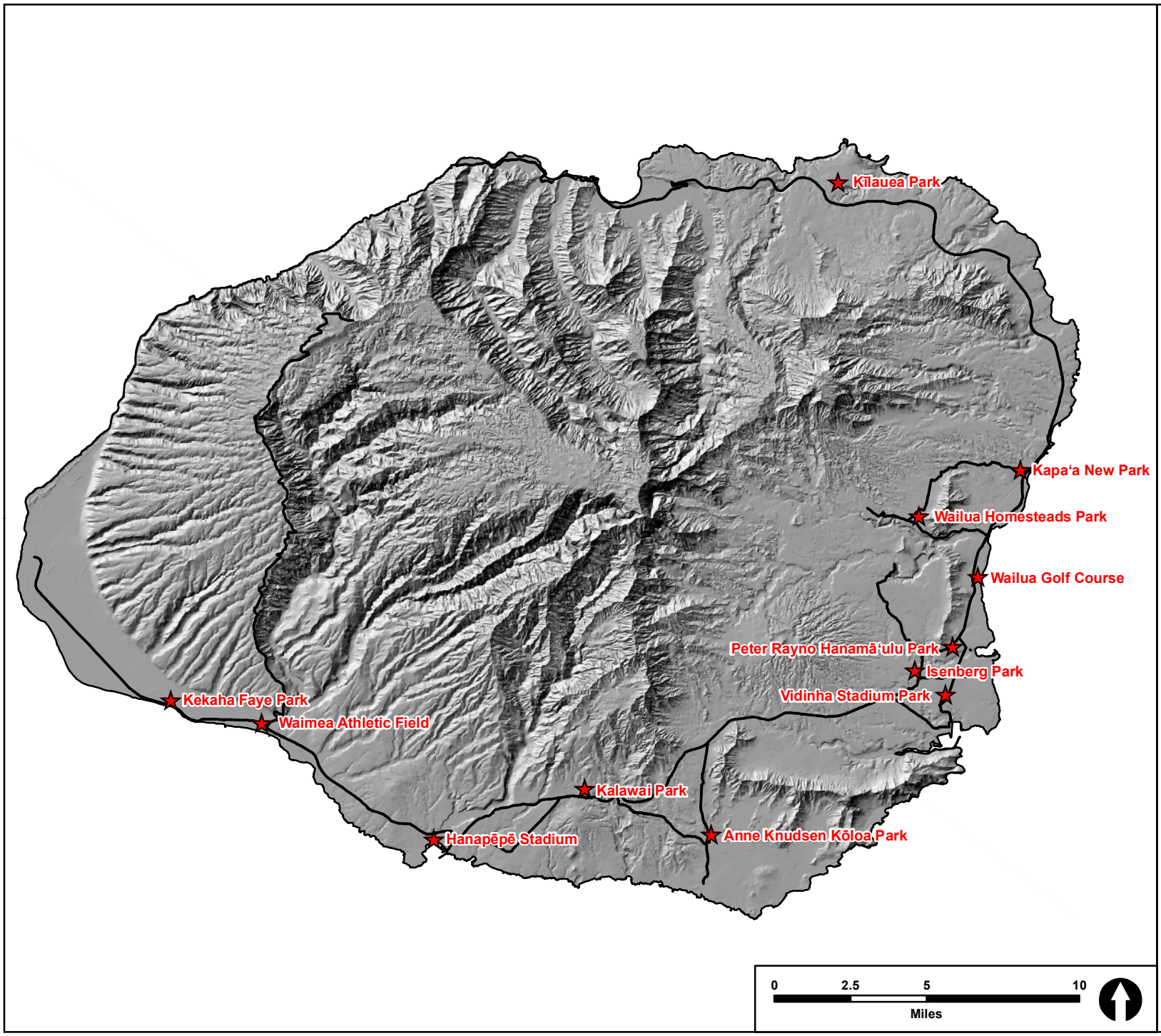
-State of Hawaii GIS
-Planning Solutions, Inc.

Figure:

Locations of Category 4 Facilities

Kauai County Habitat Conservation Plan

Category 4 County Facilities 2011-01-17.mxd



Legend:

County Facilities in Category 5: Field & Stadium Lighting

Prepared For:

County of Kauai

Prepared By:

PLANNING SOLUTIONS

Source::

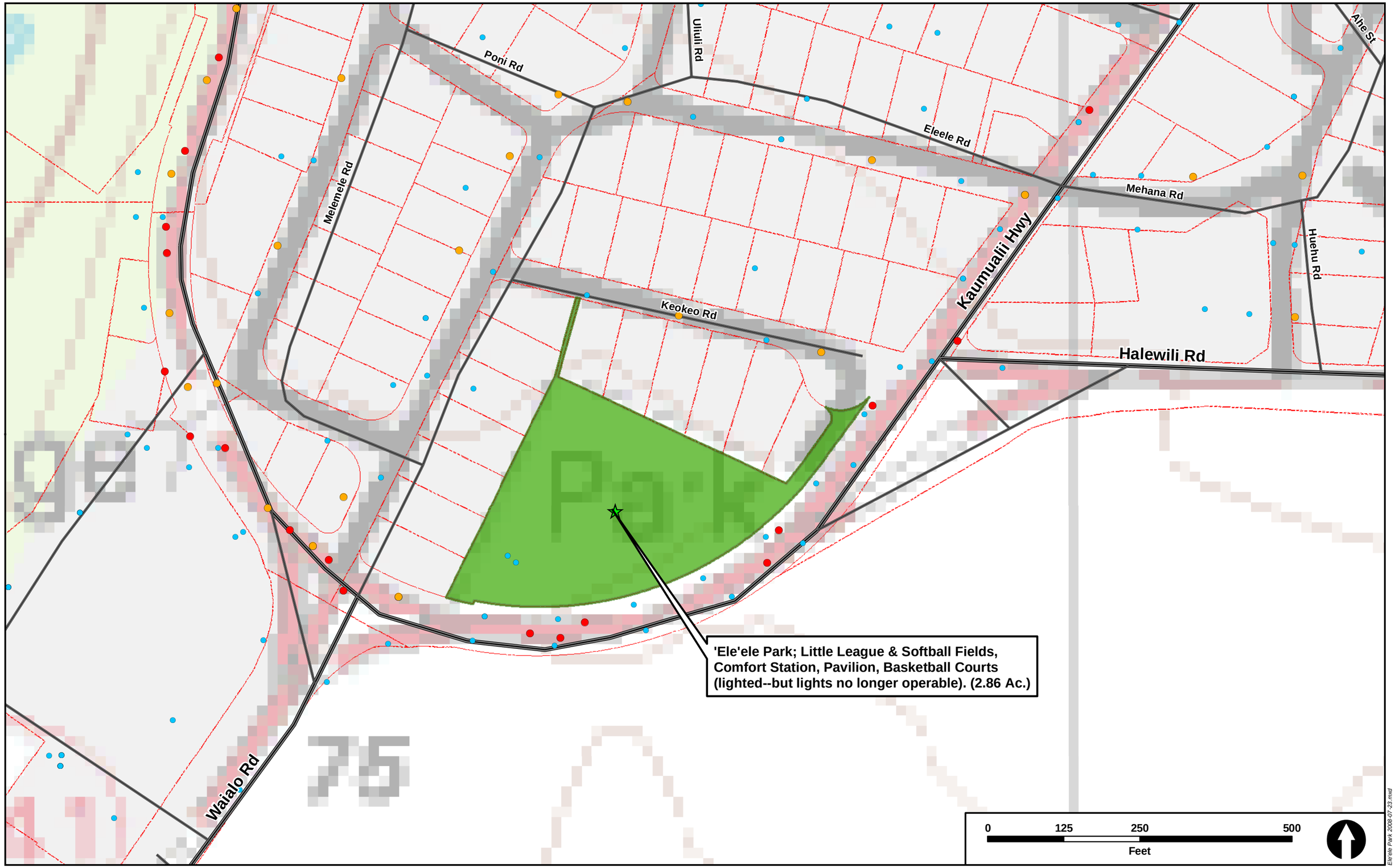
-State of Hawaii GIS
-Planning Solutions, Inc.

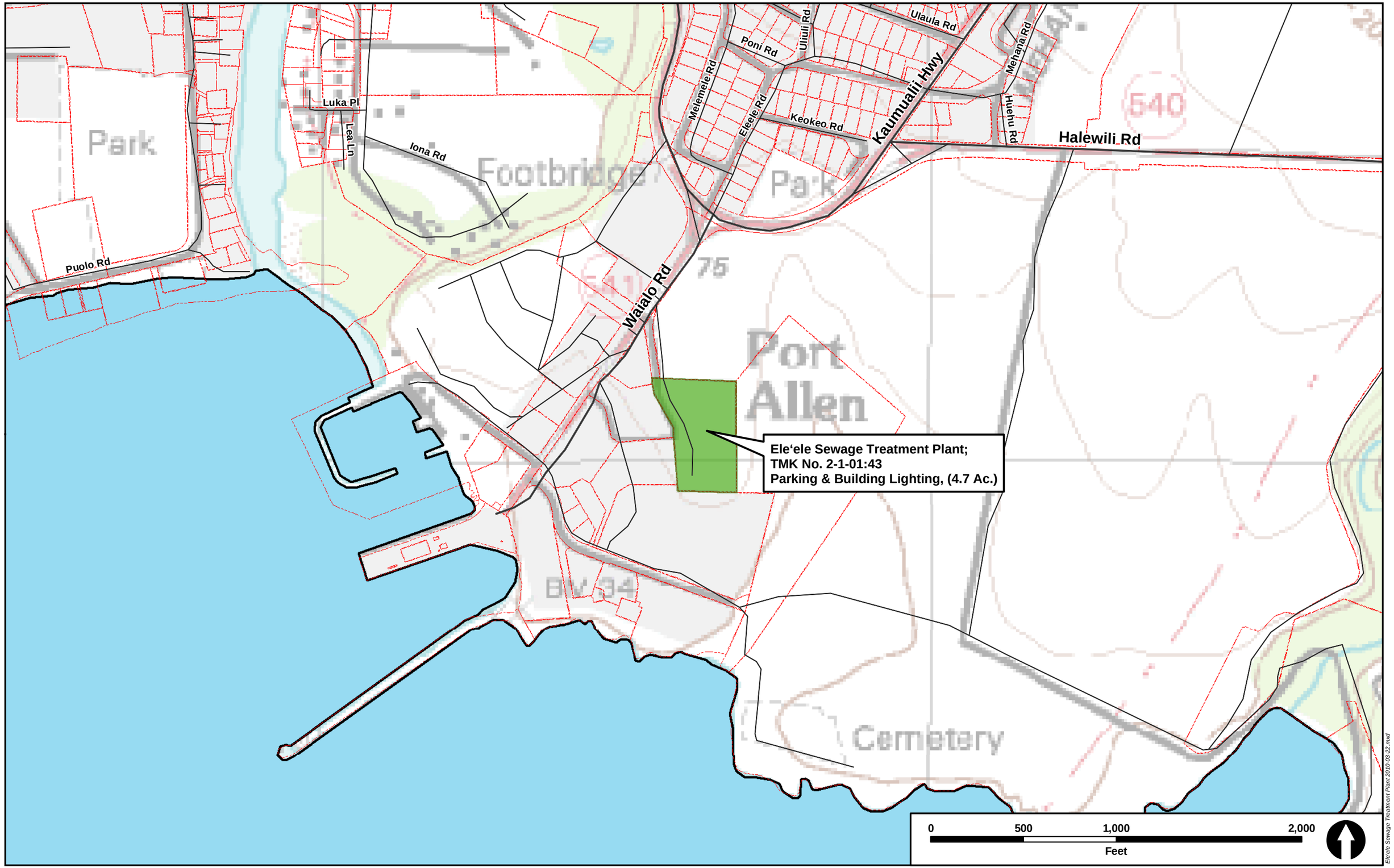
Figure:

Locations of Category 5 Facilities

Kauai County Habitat Conservation Plan

Category 5 County Facilities 2011-01-17.mxd


Poni Rd
Ululi Rd
Eleele Rd
Ahe St
Mehana Rd
Melemele Rd
Kaumualii Hwy
Huehu Rd
Keokeo Rd
Halewili Rd
Waialo Rd
'Ele'ele Park; Little League & Softball Fields, Comfort Station, Pavilion, Basketball Courts (lighted--but lights no longer operable). (2.86 Ac.)
0
125
250
500
Feet
Ele'ele Park 2008-07-23.mxd


Ele'ele Sewage Treatment Plant;
TMK No. 2-1-01:43
Parking & Building Lighting, (4.7 Ac.)
Park
Luka Pl
Lea Ln
Iona Rd
Footbridge
Park
Puolo Rd
Waialo Rd
Melemele Rd
Eleele Rd
Poni Rd
Uliuli Rd
Ulaula Rd
Keokeo Rd
Kaumualii Hwy
Mehana Rd
Huehu Rd
Halewili Rd
540
75
Port
Allen
BW 34
Cemetery
0
500
1,000
2,000
Feet
Ele'ele Sewage Treatment Plant 2010-03-22.mxd

Facility Name:	TMK Parcel No.:	Lighting Information:
Ele'ele Sewage Treatment Plant	2-1-01:43	-14 x Sodium Parking Lights
Facility Type:	**Facility Lighting:**	-4 x Sodium Flood Lights
Sanitation	Yes	-6 x Exterior Wall Fixtures
Size:	**Lighting Controls:**	
4.7 Ac.	Unknown	

Ele'ele Sewage Treatment Plant 2010-03-29.cdr

Facility Name:

Haena Beach Park

Facility Type:

Beach Park

Size:

Unknown

TMK Parcel No.:

Unknown

Facility Lighting:

Yes

Lighting Controls:

Manual

Lighting Information:

-The comfort station is lit by interior and exterior fluorescent lights.

Haena Beach Park Facility Sheet 2008-07-23.cdr

Facility Name:

Hanalei Pavilion Park

Facility Type:

Beach Park

Size:

Unknown

TMK Parcel No.:

5-5-002:019

Facility Lighting:

Yes

Lighting Controls:

Manual

Lighting Information:

-Pavilion and comfort station are lit by interior and exterior fluorescent lights.

Hanalei Pavilion 2008-07-30.cdr

Facility Name:

Hanalei Refuse Transfer Station

Facility Type:

Transfer Station

Size:

1.454 Ac.

TMK Parcel No.:

5-3-01-17

Facility Lighting:

Yes

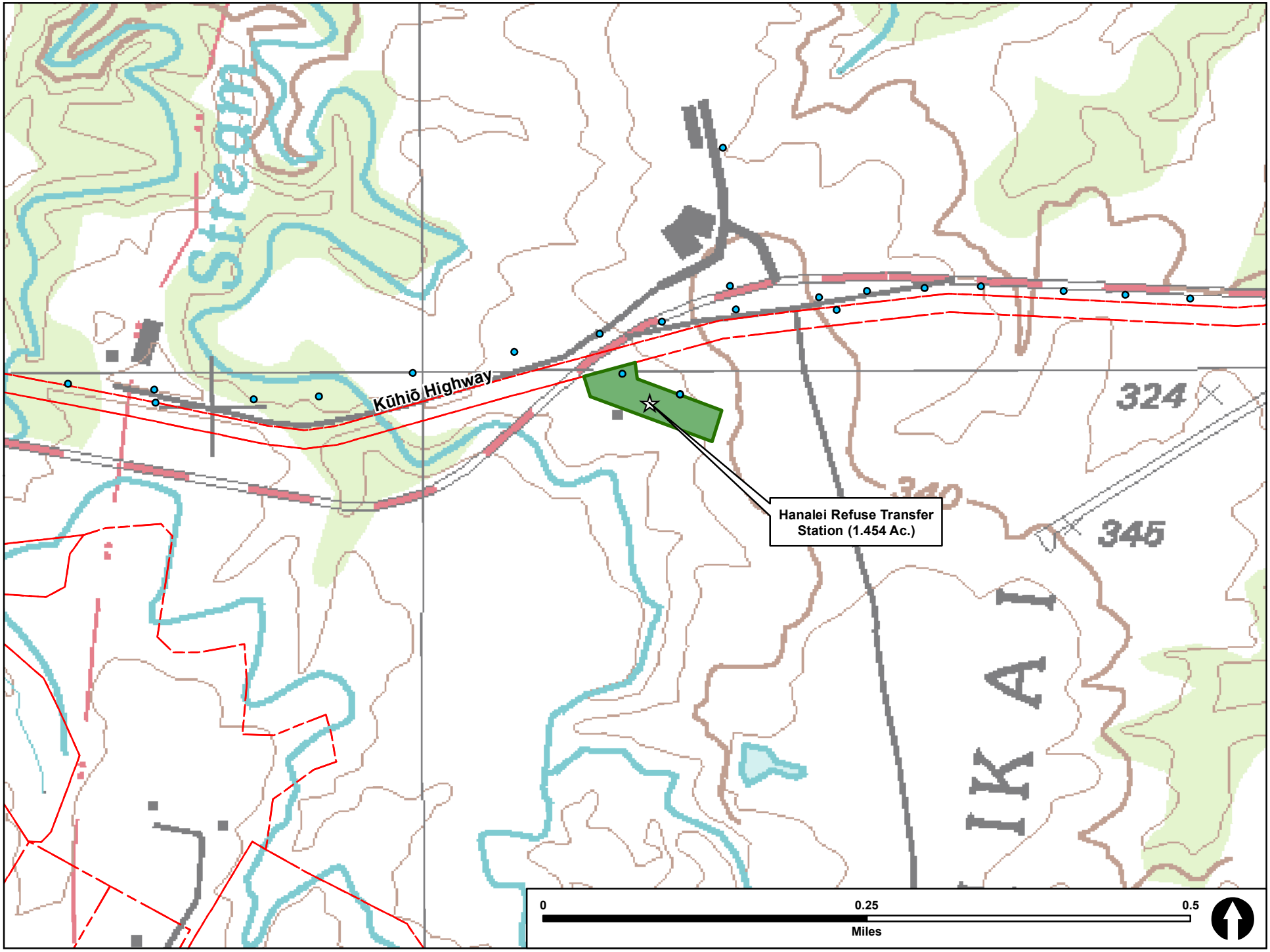
Lighting Controls:

Manual

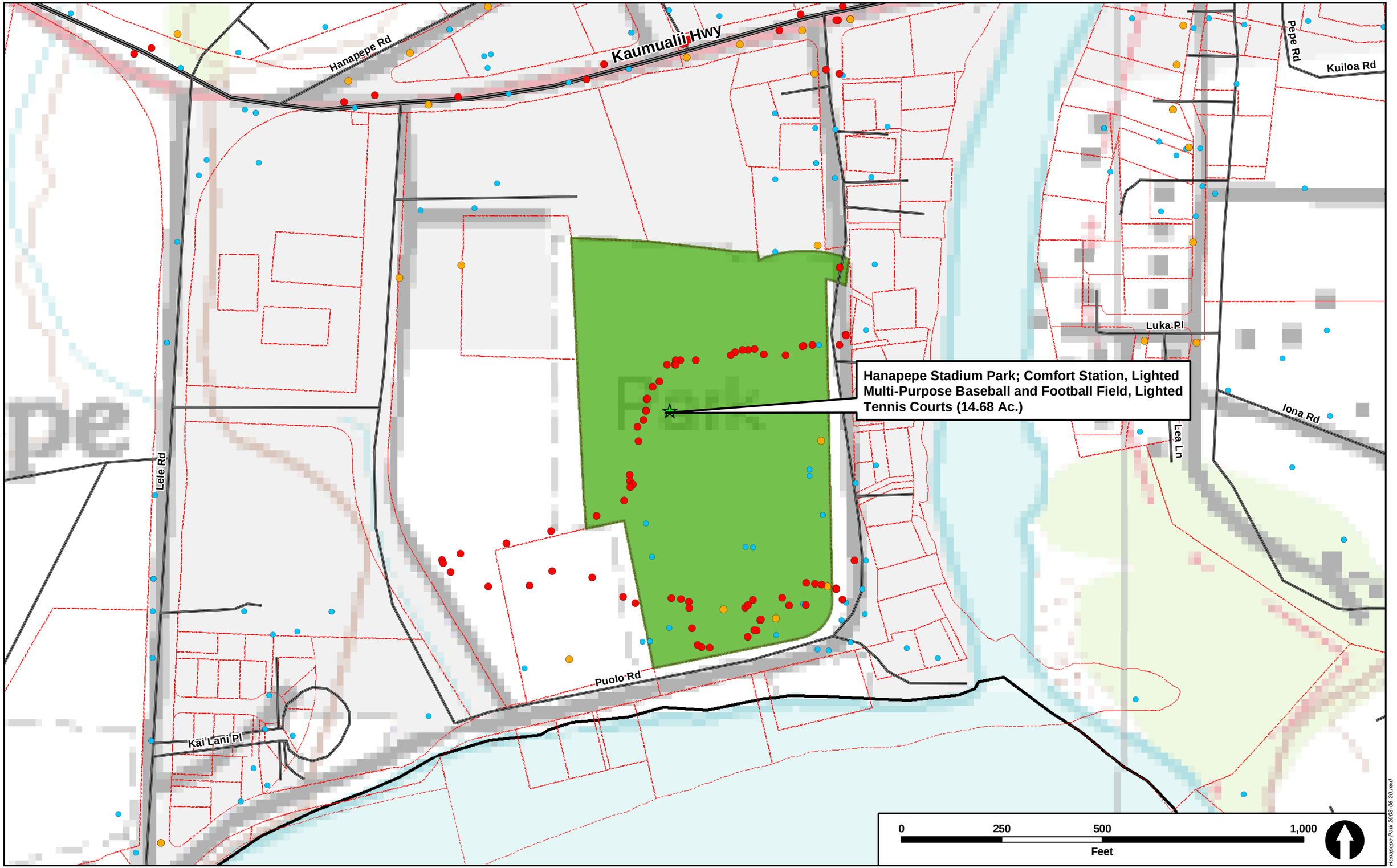
Lighting Information:

-The compactor area, comfort station and sheds have external lighting.

Hanalei Refuse Transfer Station 2009-08-31.cdr



Hanalei Refuse Transfer Station.mxd


Hanapepe Rd
Kaumualii Hwy
Pepe Rd
Kuiloa Rd
Luka Pl
Hanapepe Stadium Park; Comfort Station, Lighted Multi-Purpose Baseball and Football Field, Lighted Tennis Courts (14.68 Ac.)
Iona Rd
Lea Ln
Lele Rd
Puolo Rd
Kai'Lani Pl
0
250
500
1,000
Feet
Hanapepe Park 2008-06-20.mxd

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 Controls:

-Football field is manual by permit.
-Tennis court programmed online and manually by users.

Lighting Information:

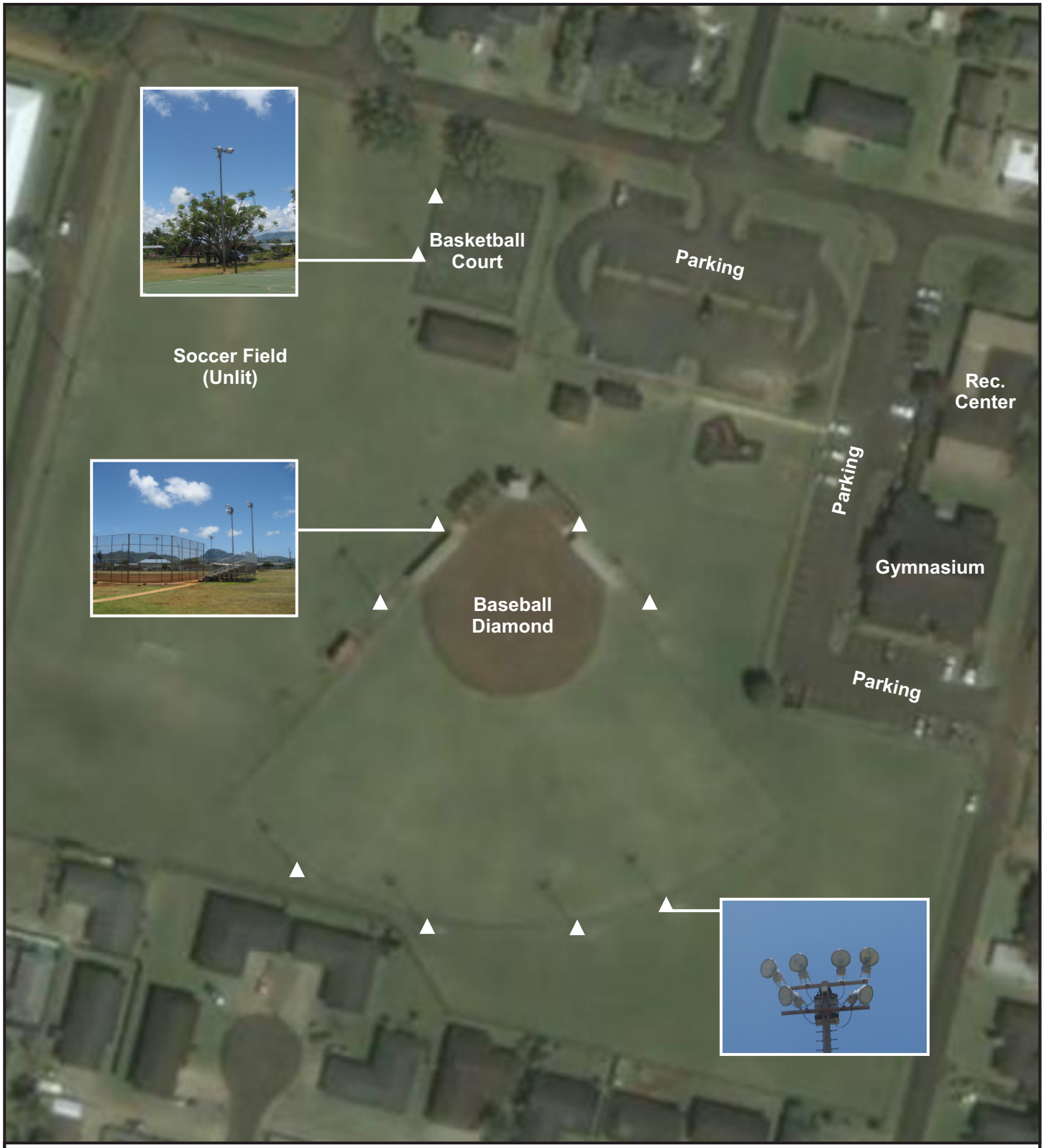
-Football & baseball fields are each illuminated by 6 poles carrying ~14 floodlights per pole.

-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.

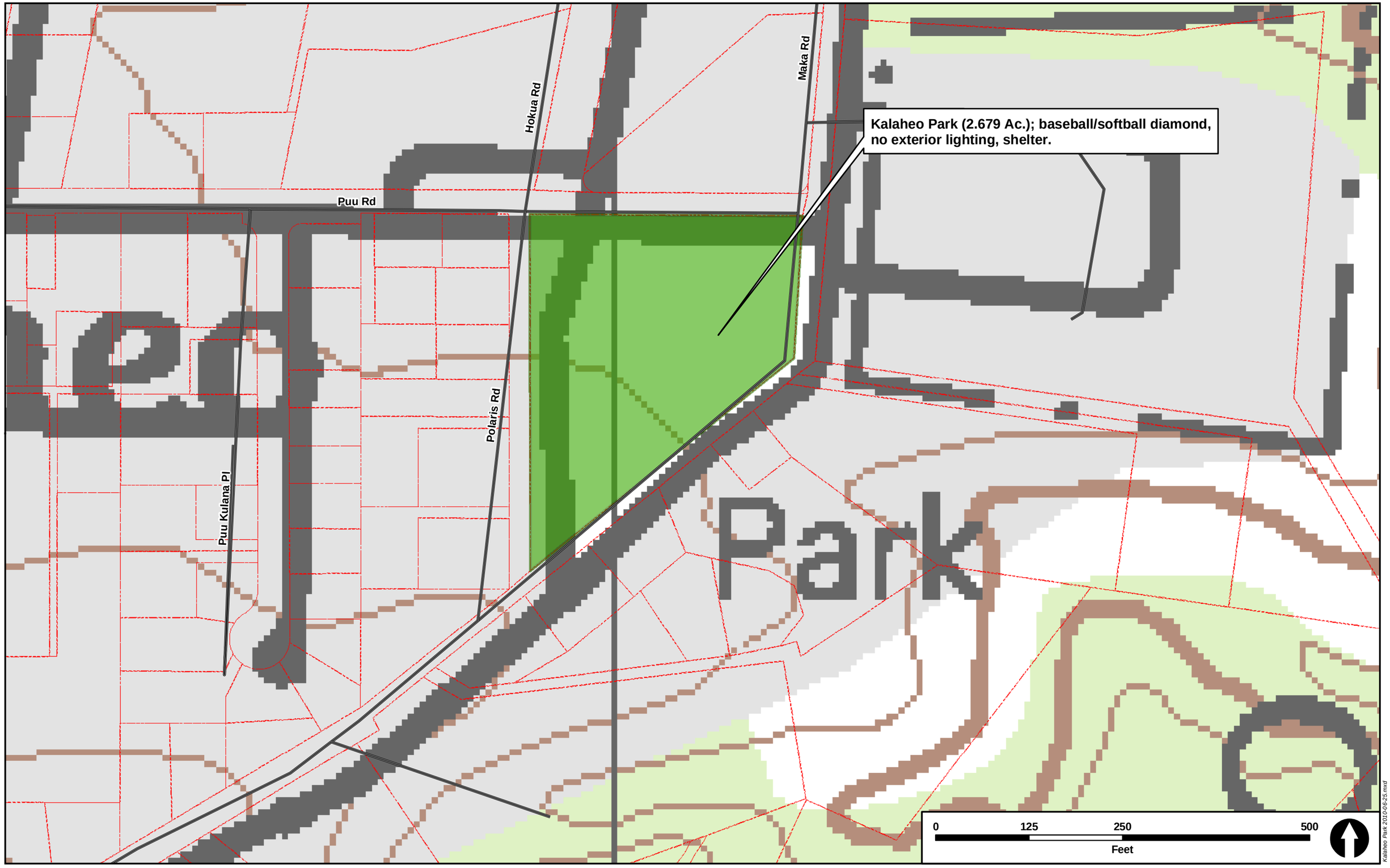
Hanapepe Park Facility Sheet 2016-08-02.cdr

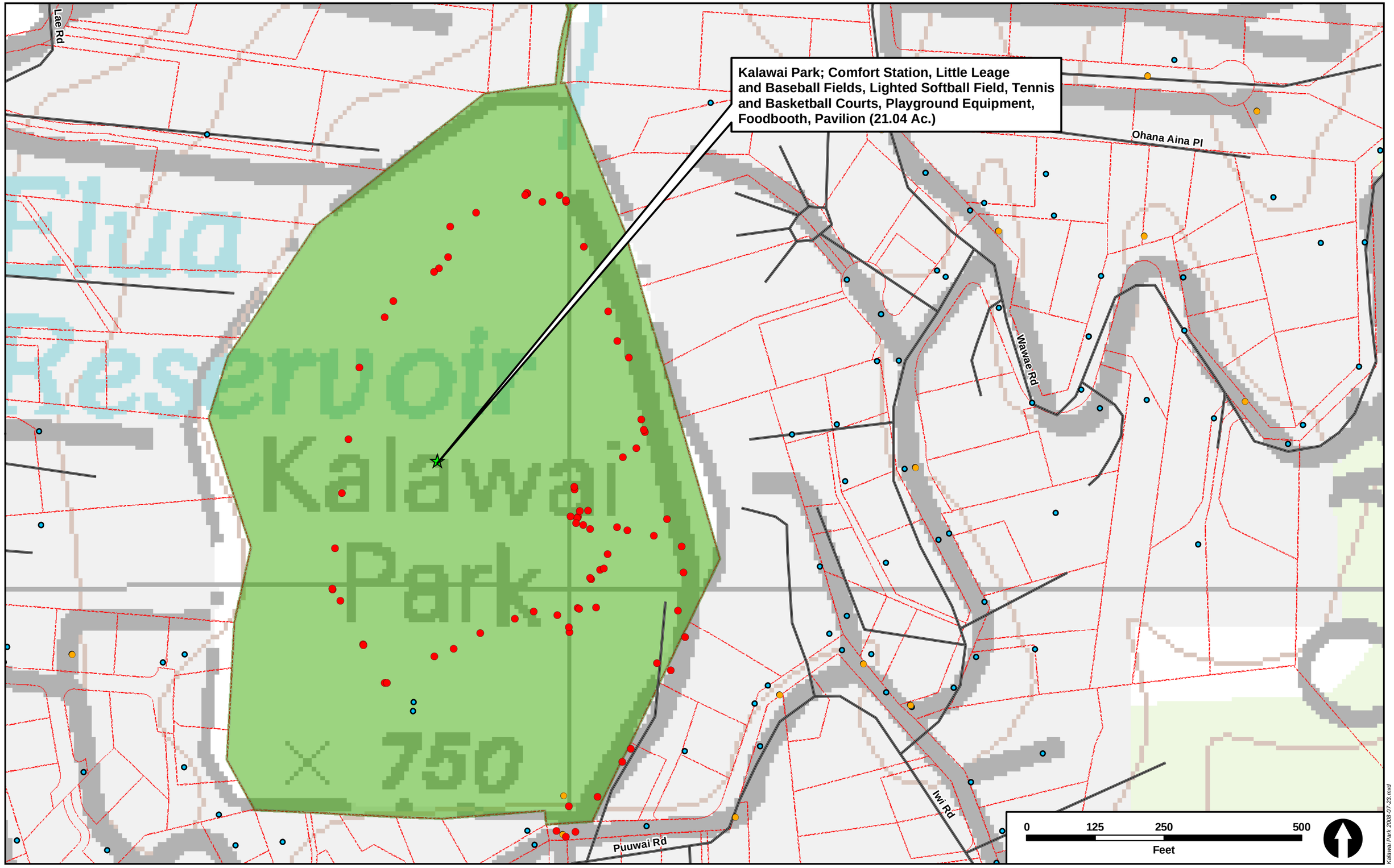
Isenberg Park 2008-07-23.mxd

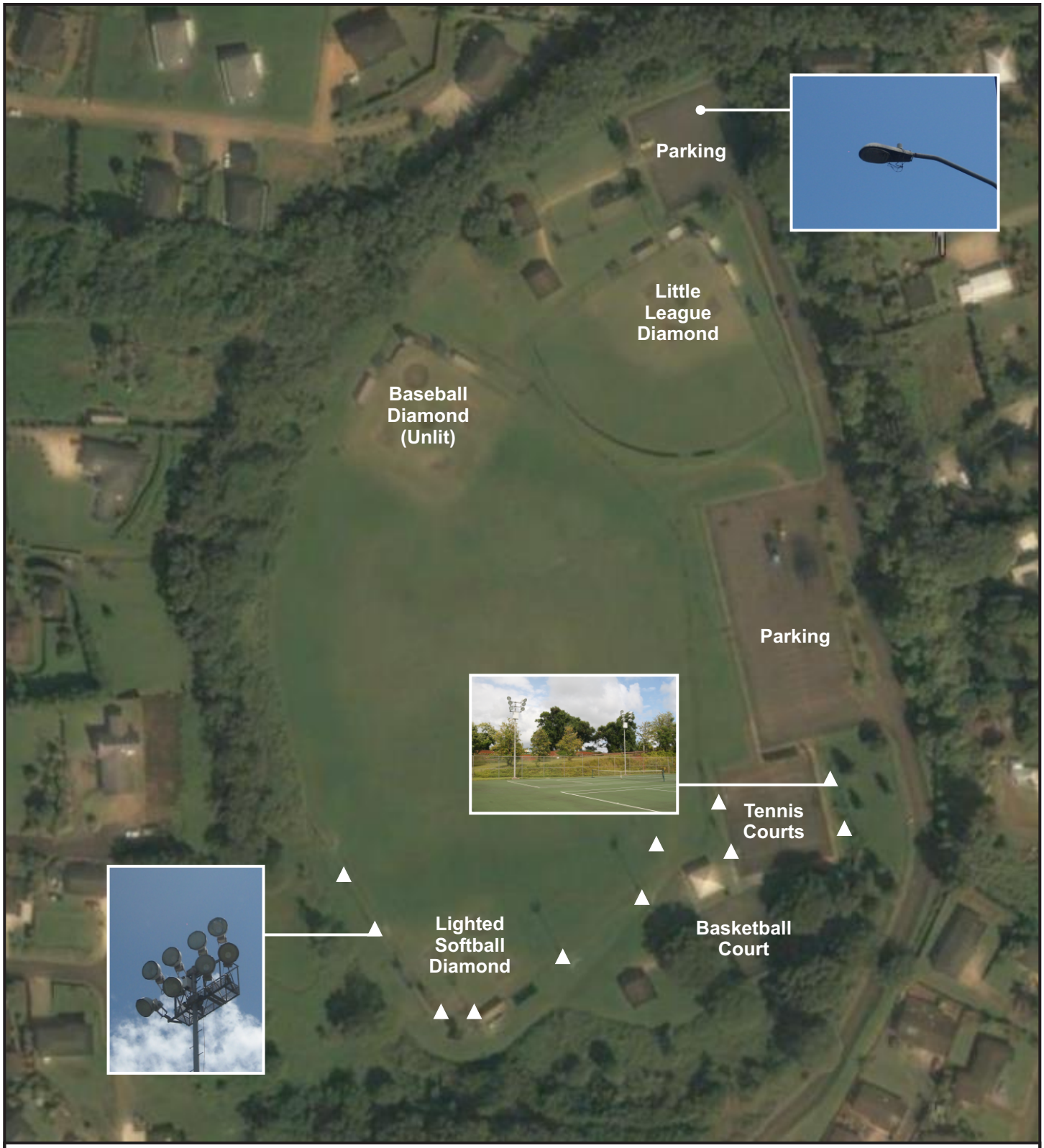


Facility Name:	TMK Parcel No.:	Lighting Information:
Isenberg Park	3-8-15:24	-Parking lot is lit with 5 unshielded streetlights. -Basketball court is illuminated by 4 poles supporting 2 floodlights each. -Baseball diamond and soccer field are lit by 8 poles with 4 to 6 floodlights each. All are unshielded. -The rec. center and gymnasium are lit with exterior fluorescent lights.
Facility Type:	**Facility Lighting:**	
Neighborhood Park (Type III)	Yes	
Size:	**Lighting Controls:**	
9.16 Ac.	-Softball field is manual by permit. -Basketball court is manual. -Parking lot is automatic.	

Isenberg Park 2016-08-02.cdr

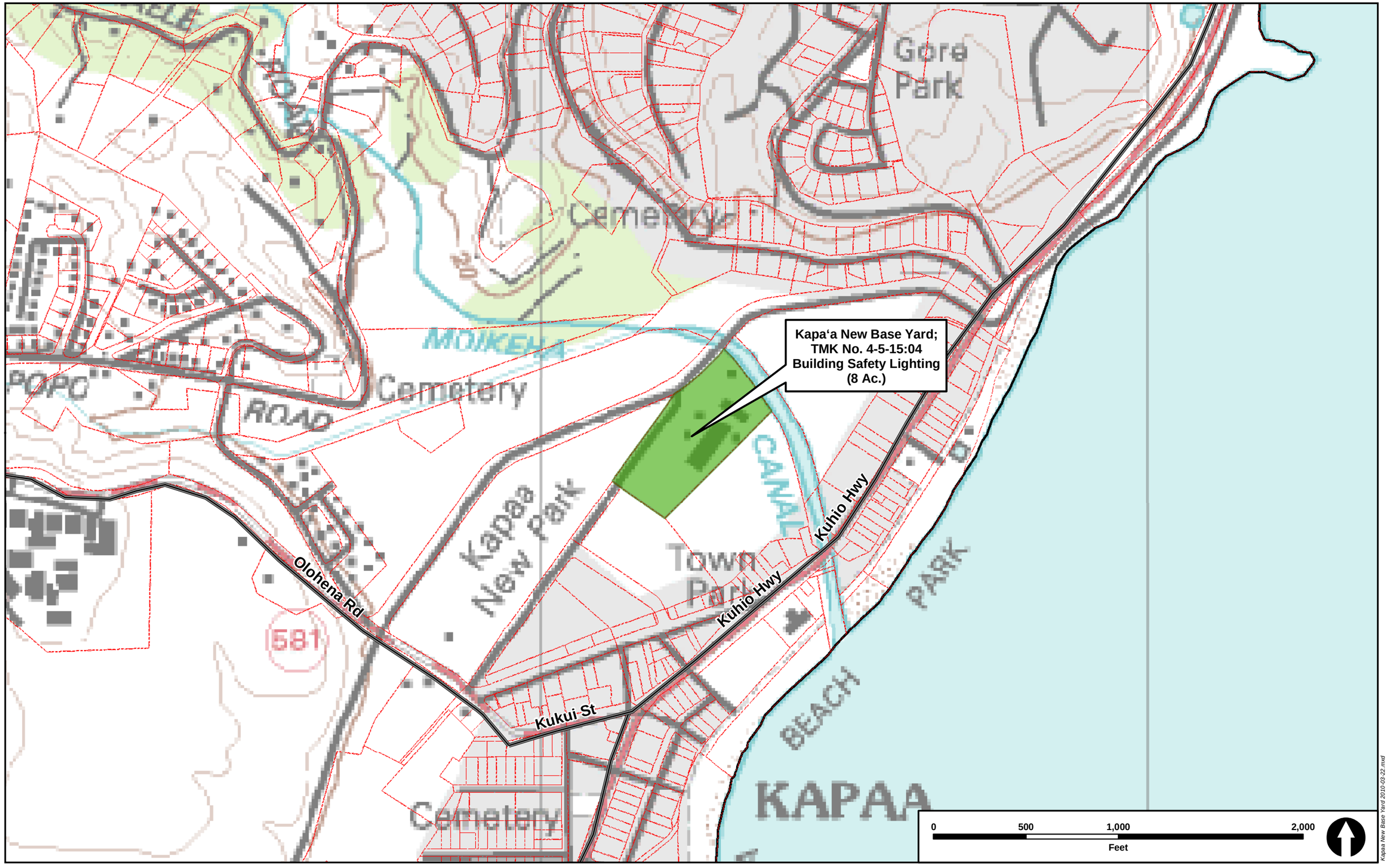

Kalaheo Park (2.679 Ac.); baseball/softball diamond, no exterior lighting, shelter.
Hokua Rd
Maka Rd
Puu Rd
Polaris Rd
Puu Kulana Pl
Park
0
125
250
500
Feet
Kalaheo Park 2010-06-25.mxd


Kalawai Park; Comfort Station, Little Leage and Baseball Fields, Lighted Softball Field, Tennis and Basketball Courts, Playground Equipment, Foodbooth, Pavilion (21.04 Ac.)
Lae Rd
Ohana Aina Pl
Wawae Rd
Iwi Rd
Puuwai Rd
Kalawai Park
750
0
125
250
500
Feet
Kalawai Park 2008-07-23.mxd



Facility Name:	TMK Parcel No.:	Lighting Information:
Kalawai Park	2-4-05:13	-Softball field is lit by 6 poles with 6-8 floodlights each.
Facility Type: District Park (Type II)	**Facility Lighting:** Yes	-Tennis court has 4 poles with 6 floodlights each.
Size: 21.04 Ac.	**Lighting Controls:** -Programmed online -Tennis on demand - Softball by permit.	-Bathrooms and 2 storerooms are lit by interior and exterior fluorescent lights.
		-Basketball court and playground equipment are unlit.
		-Access road has truncated streetlights.

Kalawai Park 2016-08-02.cdr



Kapaa New Base Yard 2010-03-22.mxd

Facility Name:

Kapa'a New Base Yard

Facility Type:

Base Yard

Size:

8 Ac.

TMK Parcel No.:

4-5-15:04

Facility Lighting:

Yes

Lighting Controls:

6:00PM-6:00AM

Lighting Information:

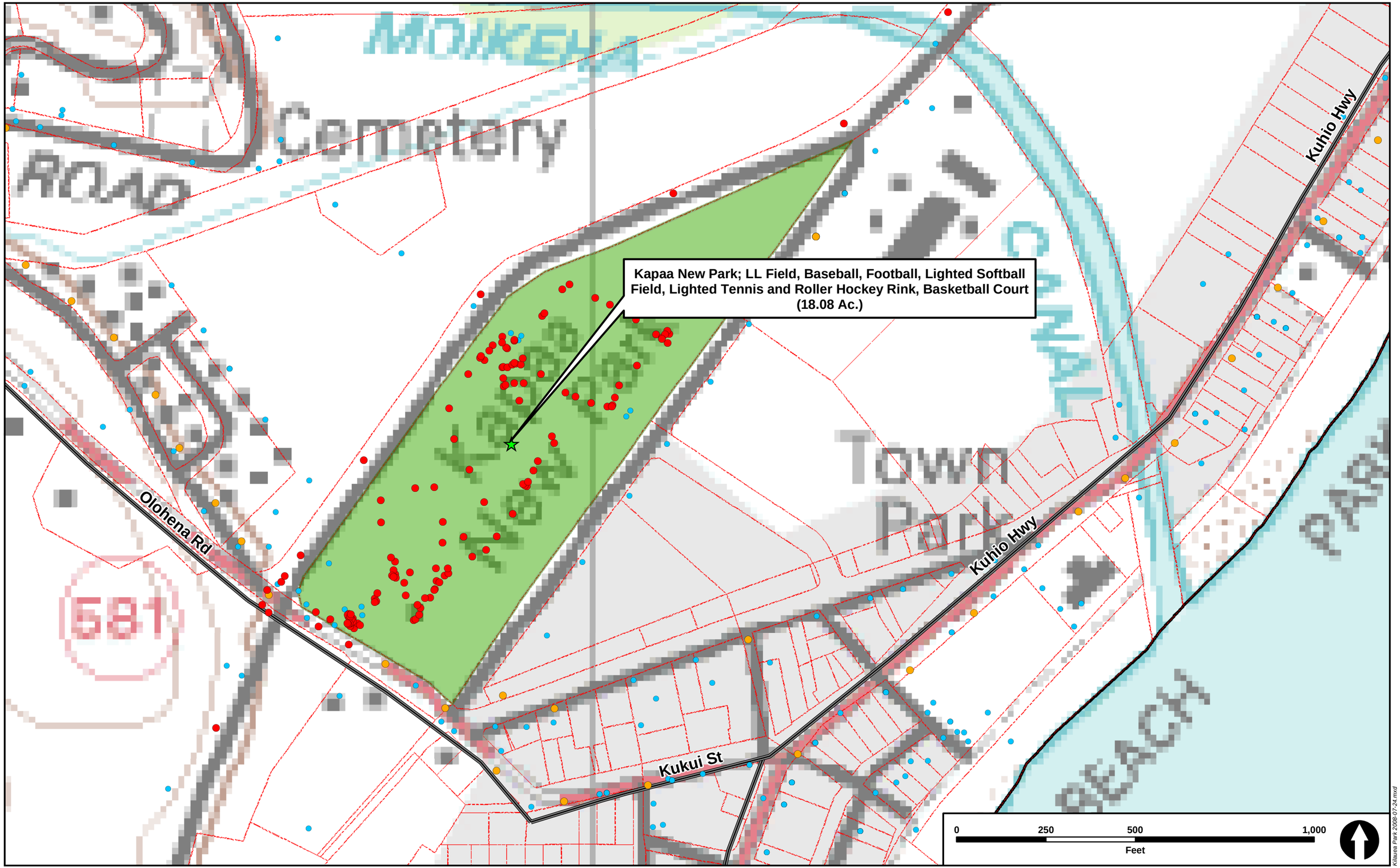
-26 x 9 watt Compact Fluorescent Lights

-3 x 27 watt Compact Fluorescent Lights

-4 x 150 watt High Pressure Sodium Lights

-Lights are in use all week, from dusk until dawn.

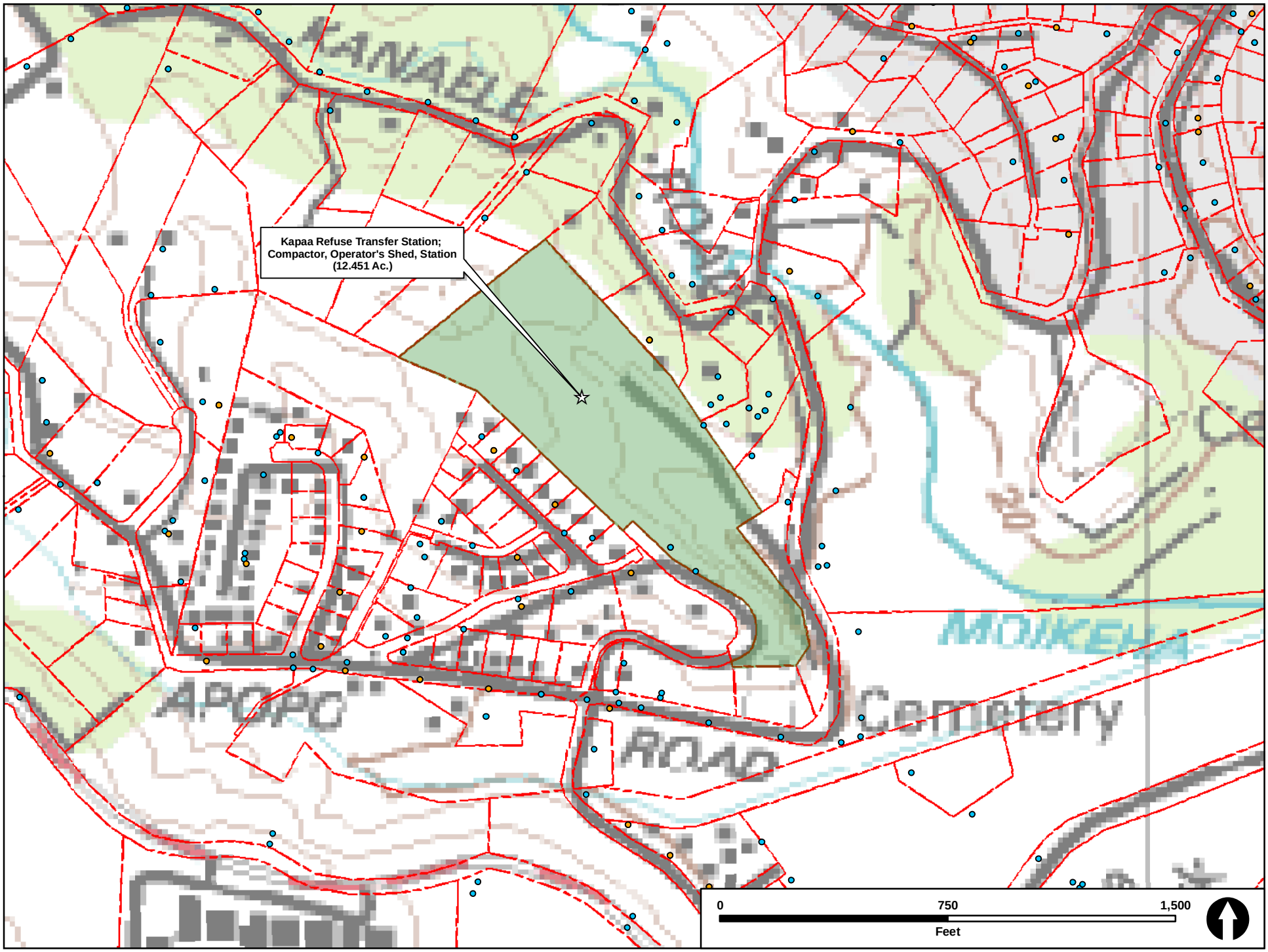
Kapaa New Base Yard 2010-03-25.cdr



Kilauea Park 2008-07-24.mxd

Facility Name:	TMK Parcel No.:	Lighting Information:
Kapaa (New) Park	4-5-15:32	-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.
Facility Type: District Park (Type II)	**Facility Lighting:** Yes	
Size: 18.08 Ac.	**Lighting Controls:** Basketball and tennis courts programmed online; others are manual.	

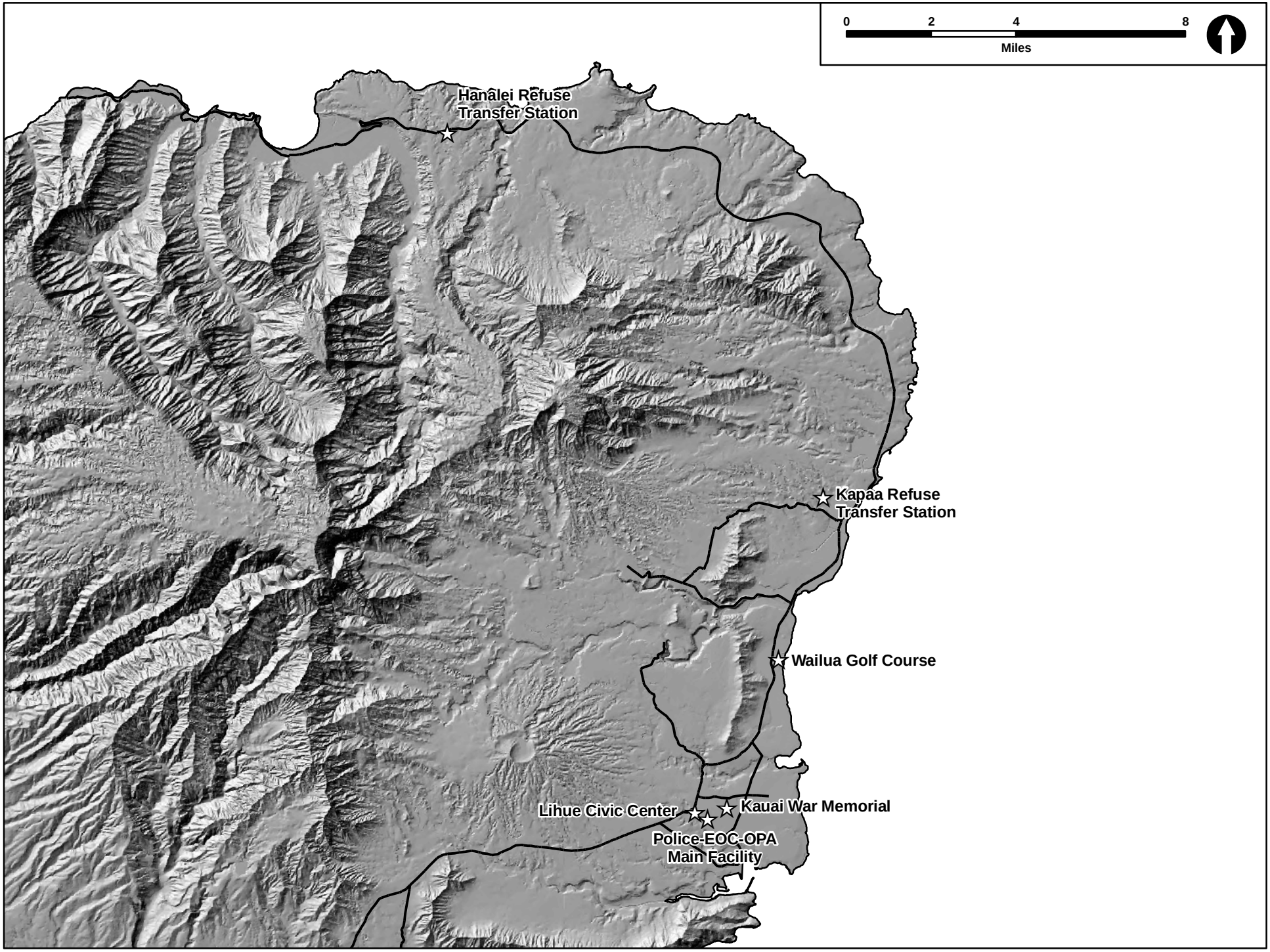
Kapaa New Park 2016-08-02.cdr



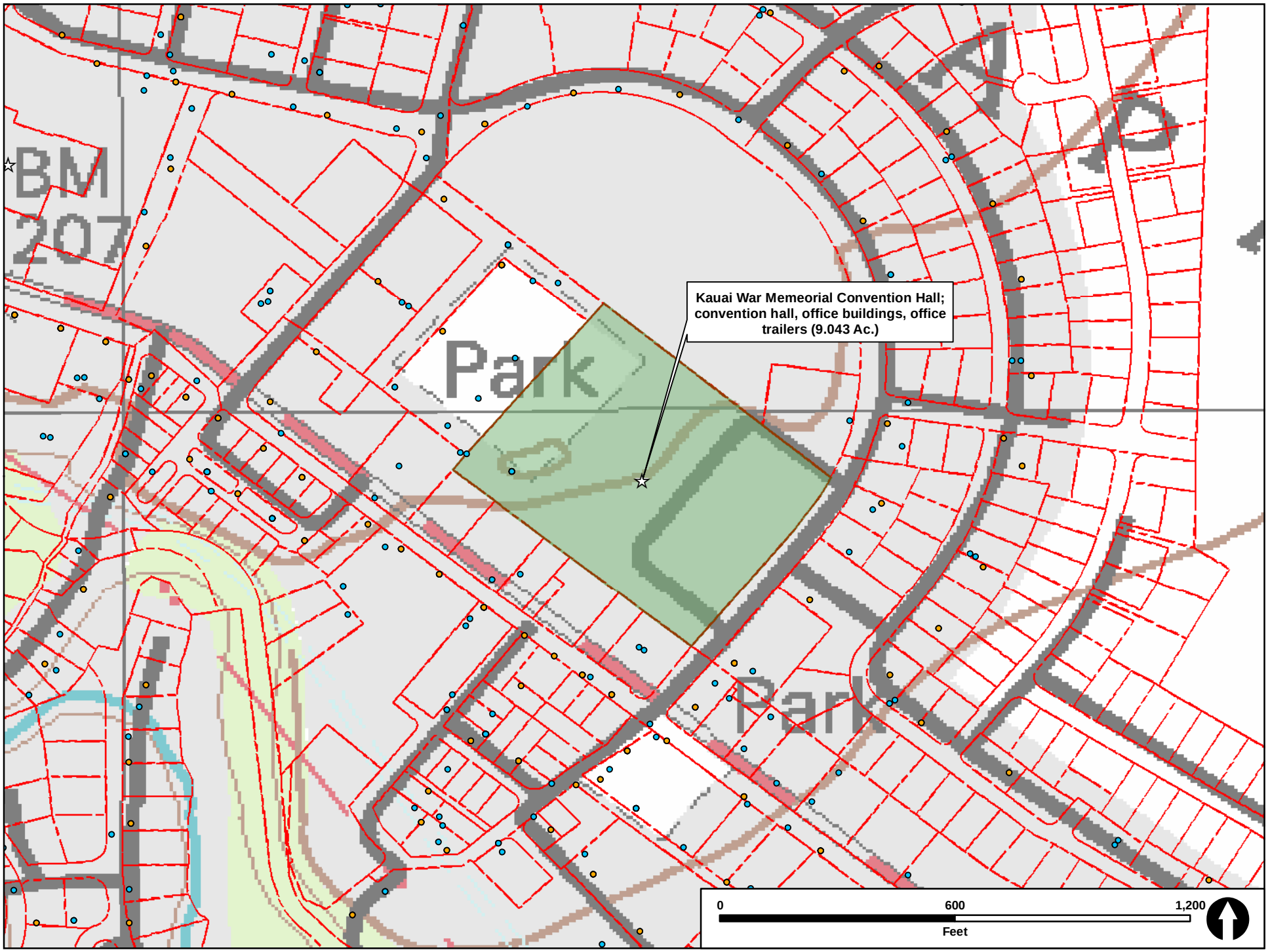
Kapaa Refuse Transfer Station 2009-08-31.mxd

Facility Name:	TMK Parcel No.:	Lighting Information:
Kapaa Refuse Transfer Station	4-6-12:4	-Compactor, Operator's Shed and Comfort Station are all lit.
Facility Type:	**Facility Lighting:**	
Transfer Station	Yes	
Size:	**Lighting Controls:**	
12.451 Ac.	Unknown	

Kapaa Refuse Transfer Station 2009-08-31.cdr



Kauai County Other Lighted Facilities 2009-03-12.mxd


Kauai War Memeorial Convention Hall; convention hall, office buildings, office trailers (9.043 Ac.)
BM
207
Park
Park
0
600
1,200
Feet
Kauai War Memorial Convention Hall 2009-08-31.mxd

Facility Name:
Kauai War Memorial Convention Hall

Facility Type:
Convention Hall & Office Building

Size:
9.043 Ac.

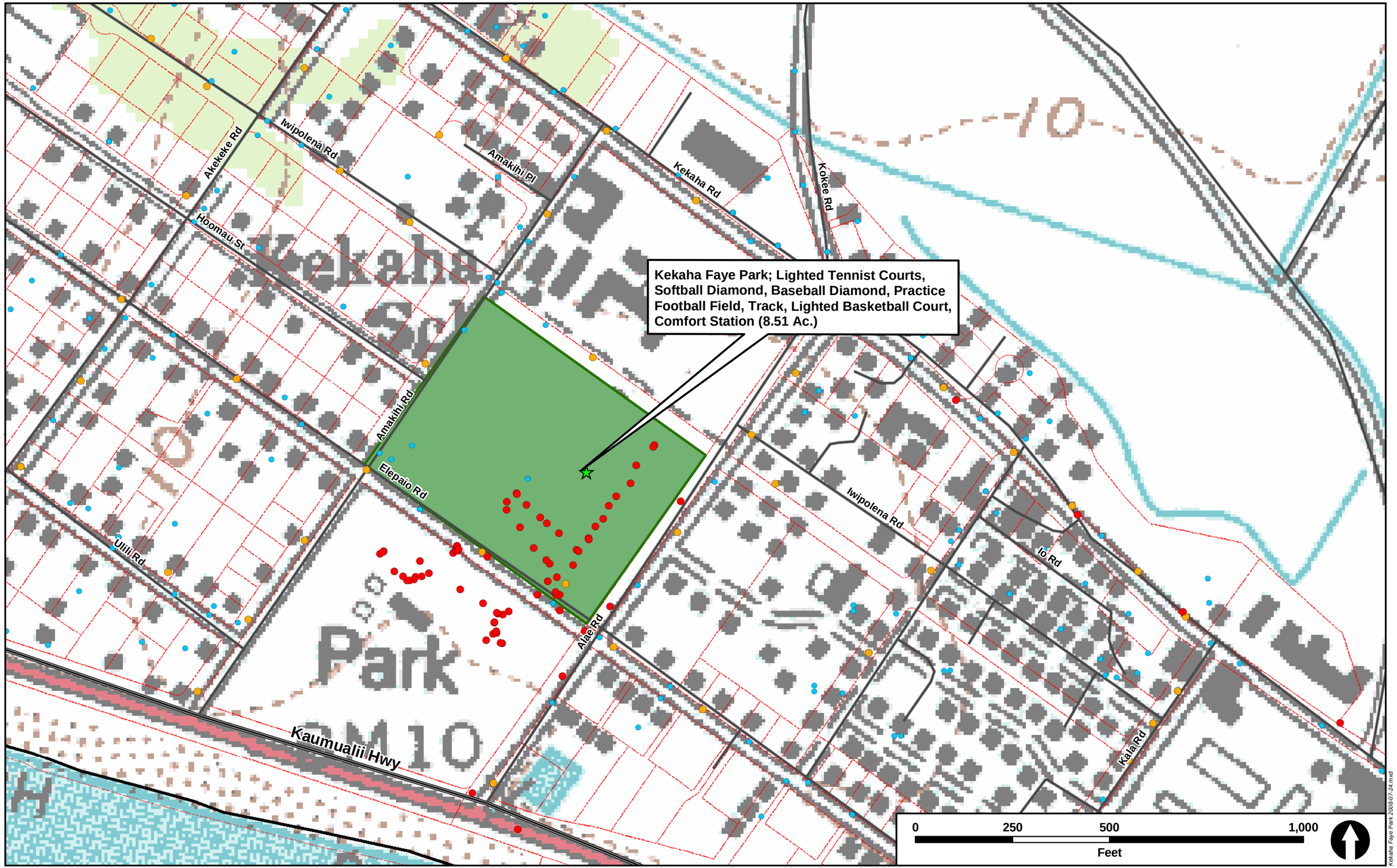
TMK Parcel No.:
3-6-2:9

Facility Lighting:
Yes

Lighting Controls:
Unknown

Lighting Information:
-Convention hall, office buildings, office trailers and parking all have area lighting.

Kauai War Memorial Convention Hall 2009-08-31.cdr



Kekaha Faye Park 2008-07-24.mxd

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 Controls:

-Softball programmed online by permit.
-Basketball and tennis on demand.

Lighting Information:

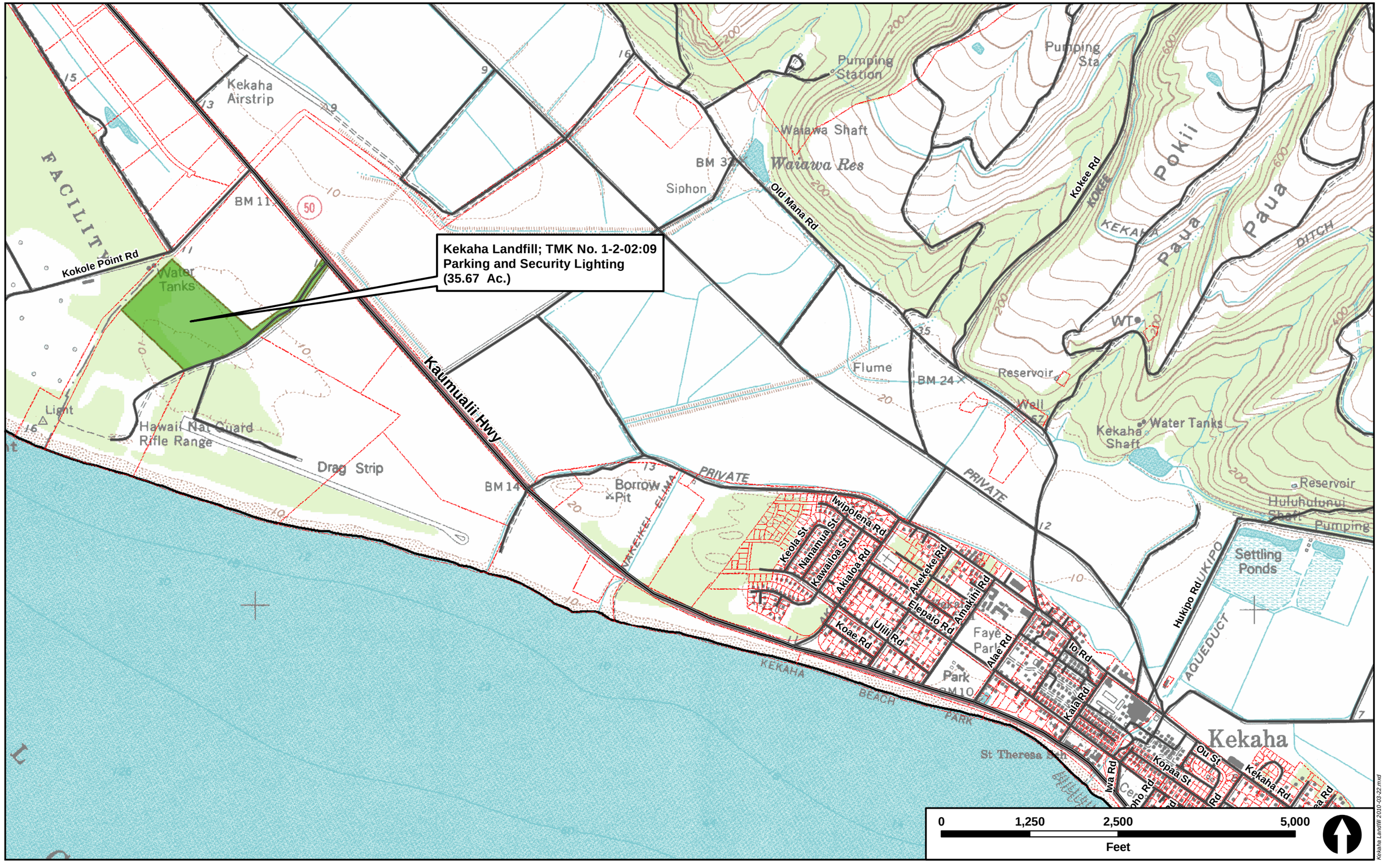
-6 poles with 8-10 floodlights each illuminate the baseball diamond and are manually controlled.

-2 streetlight type poles illuminate an auxiliary parking area.

-Comfort station lit with strip fluorescent lights.

-Basketball court and football practice field are unlit.

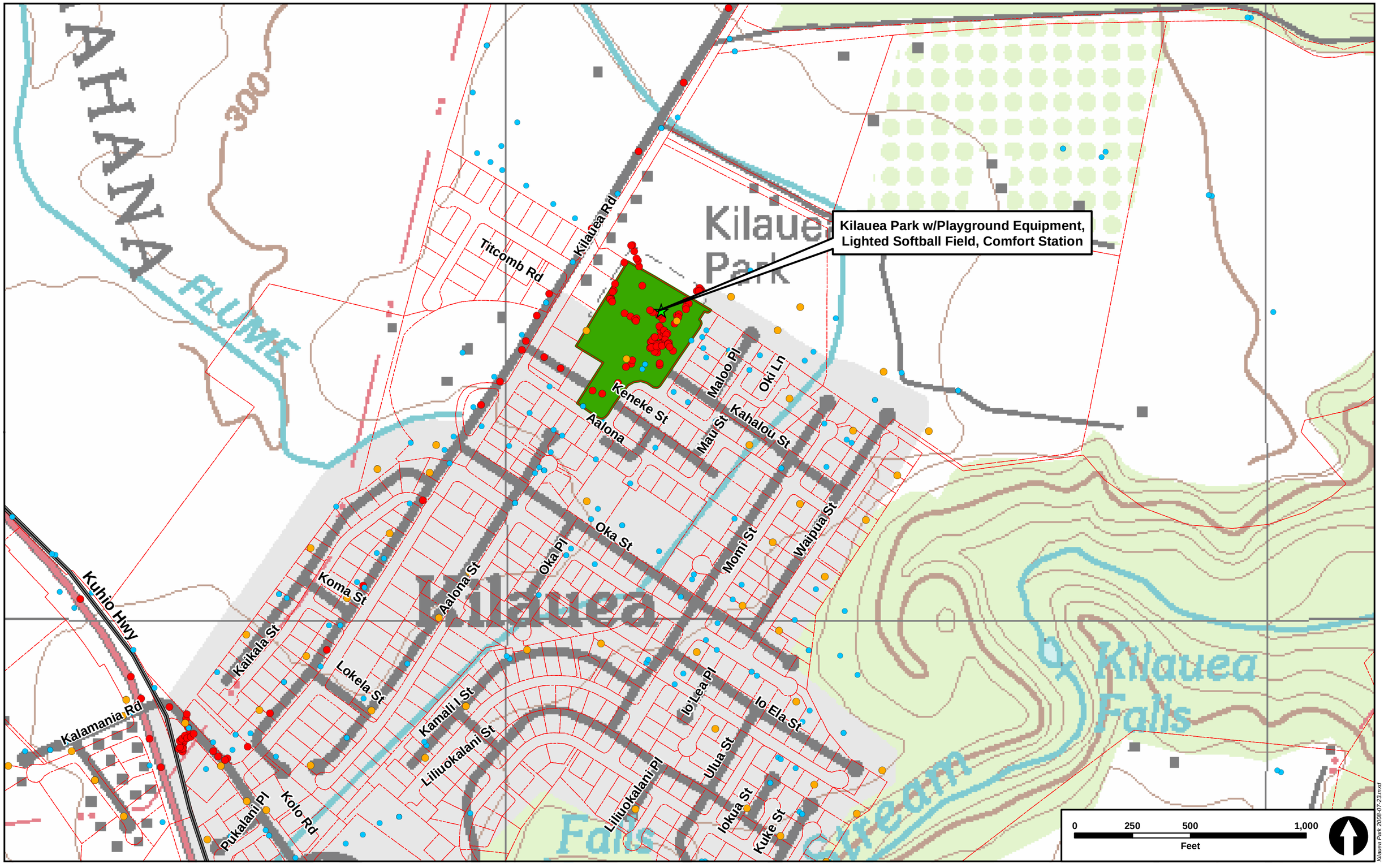
Kekaha Faye Park 2016-08-02.cdr



Kekaha Landfill 2010-03-22.mxd

Facility Name:	TMK Parcel No.:	Lighting Information:
Kekaha Landfill	1-2-02:09	-9 x 400 watt Sodium Parking Lights
Facility Type:	**Facility Lighting:**	-5 x 50 watt Recessed Sodium Building Lights
Sanitation	Yes	-5 x 75 watt Incandescent Lights
Size:	**Lighting Controls:**	-3 x High Pressure Sodium Lights
35.67 Ac.	Unknown	-Lights are in use all week, from dusk until dawn.

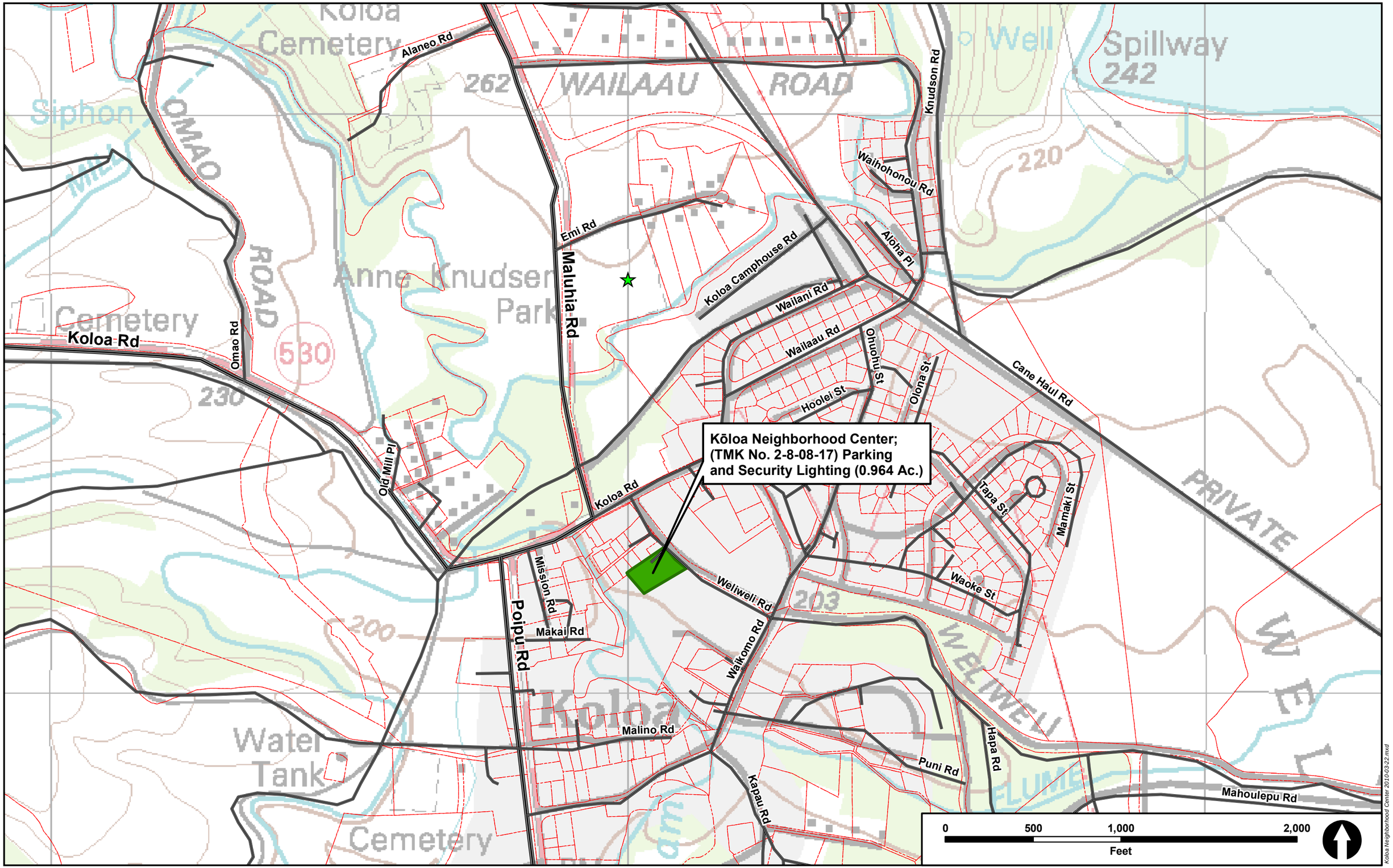
Kekaha Landfill 2010-03-25.cdr



Kilauea Park 2008-07-23.mxd

Facility Name:	TMK Parcel No.:	Lighting Information:
Kilauea Park	5-2-08:54	-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.
Facility Type:	**Facility Lighting:**	
District Park (Type II)	Yes	
Size:	**Lighting Controls:**	
4.93 Ac.	Manual by permit.	

Kilauea Park 2016-08-02.cdr



Koloa Neighborhood Center 2010-03-22.mxd

Facility Name:

Kōloa Neighborhood Center

Facility Type:

Community Center

Size:

0.97 Ac.

TMK Parcel No.:

2-8-08:17

Facility Lighting:

Yes

Lighting Controls:

7:00PM-7:00AM

Lighting Information:

-5 x 150 watt High Pressure Sodium Lights

-16 x Fluorescent Exterior Security Lights

-6 x Exterior Wall Fixtures

-Lights are on all night.

Koloa Neighborhood Center 2010-03-29.cdr

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.

Lihue Auto Maintenance Garage & Office 2010-03-30.cdr

Lihu'e Auto Maintenance Gargage & Office;
TMK No. 3-8-05:17
Security Lighting (1.541 Ac.)
Cemetery
Nawiliwili
Park
Pua Loke
Kuhio
Hoomana Rd
Kaumualii Hwy
Nawiliwili Rd
Wehe Rd
Haleko Rd
Kukui Grove St
Halehaka Rd
unnamed road
Poinciana St
Kuhio Hwy
Kali Rd
Hardy St
Ewa St
Ewalu St
Waa Rd
Kele St
Malae St
Kaana St
Lalei Pl
Palai St
Alohi St
Uluhui St
Umi St
Eliu St
Akahi St
Fujii St
Inouye St
Jerves St
Kupu Ln
Kokio St
Iliahi St
Mohala St
Pua Loke St
Kiele Ln
Pua Nani St
Kress St
Rice St
Kalena St
Malama St
Hoala St
Umahe St
Puaole St
Hoene St
Pualiki St
Pikake St
Aukoi St
Aheahe Pl
Aheahe St
Hili St
Huna St
Kepa St
Hili Pl
Palau Manu St
Kanani St
Opuu Ln
Paia St
Kapena Pl
Hoolako St
Hoolako Pl
Onionii St
223
200
50
0
1,250
2,500
Feet
Lihue Auto Maintenance Garage 2010-03-22.mxd

Facility Name:
Līhuʻe Civic Center

Facility Type:
Office Buildings

Size:
1.5369 Ac.

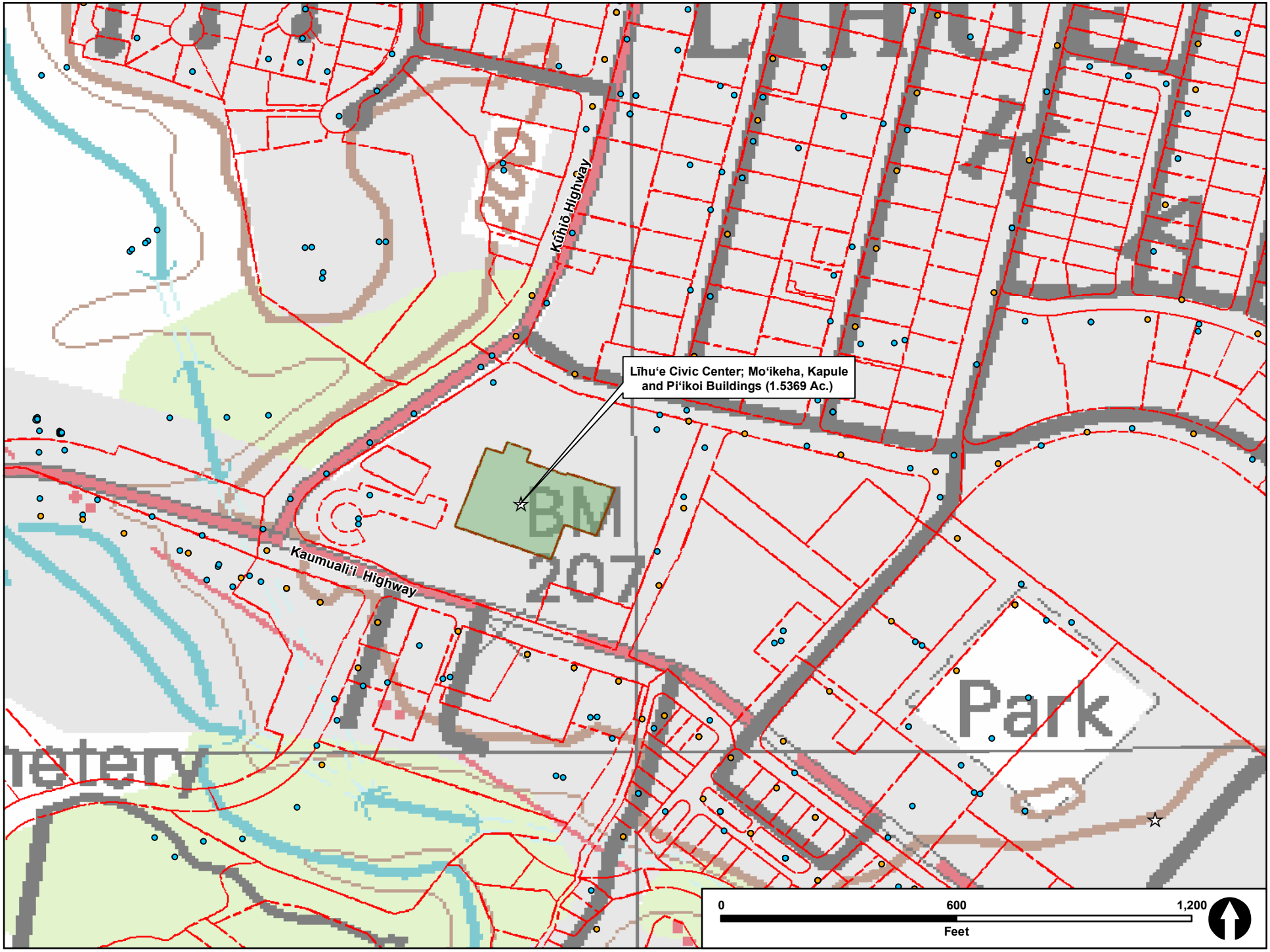
TMK Parcel No.:
3-6-5:27

Facility Lighting:
Yes

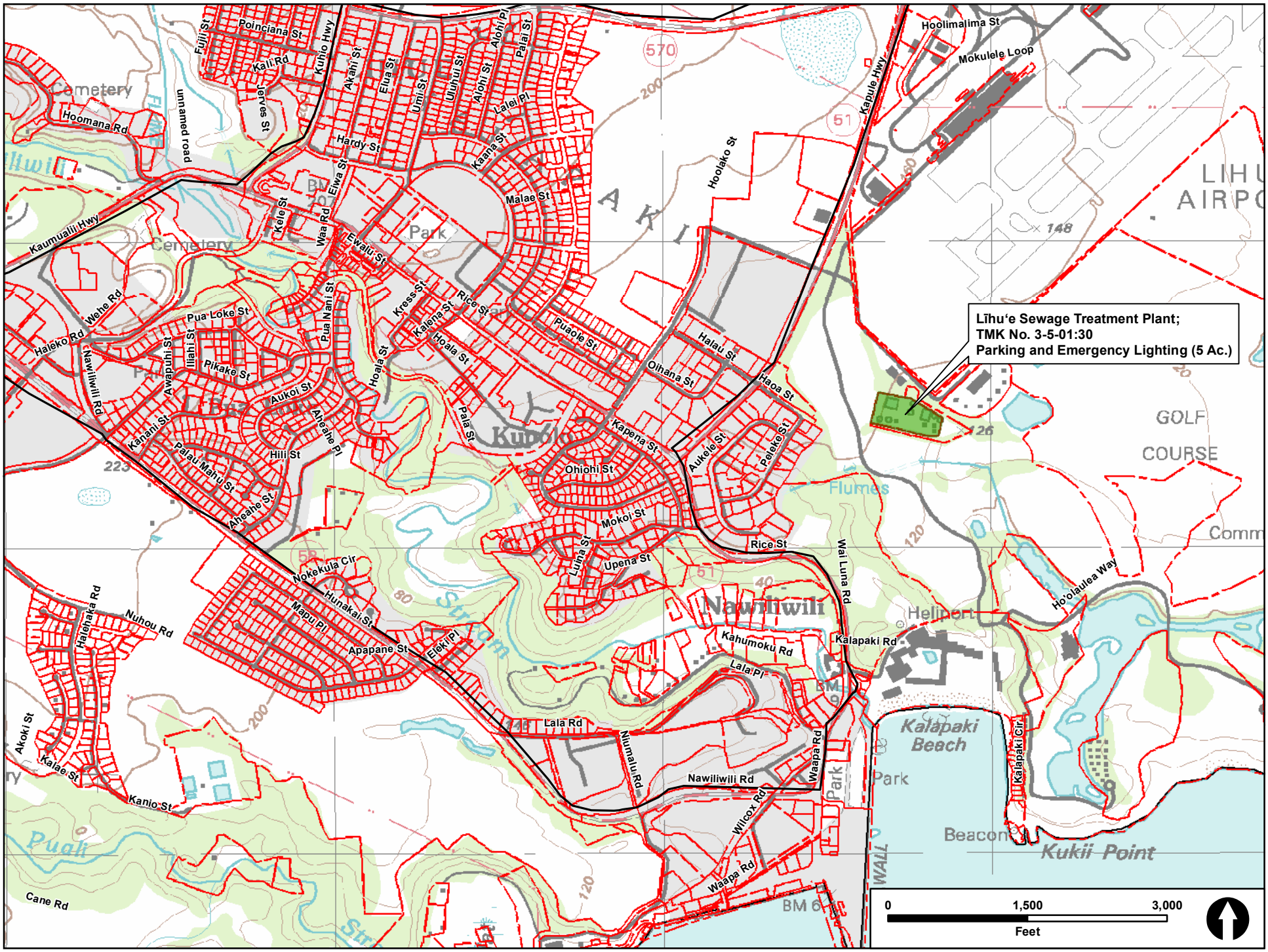
Lighting Controls:
Unknown

Lighting Information:
-Moʻikeha, Kapule and Piʻikoi Buildings all have area and parking lighting.

Lihue Civic Center 2009-08-31.cdr



Lihue Civic Center 2009-09-01.mxd



0 1,500 3,000
Feet

Lihue Sewage Treatment Plant 2010-03-22.mxd

Facility Name:

Līhu'e Sewage Treatment Plant

Facility Type:

Sanitation

Size:

5 Ac.

TMK Parcel No.:

3-5-01:30

Facility Lighting:

Yes

Lighting Controls:

Unknown

Lighting Information:

-19 x Sodium Parking Lights

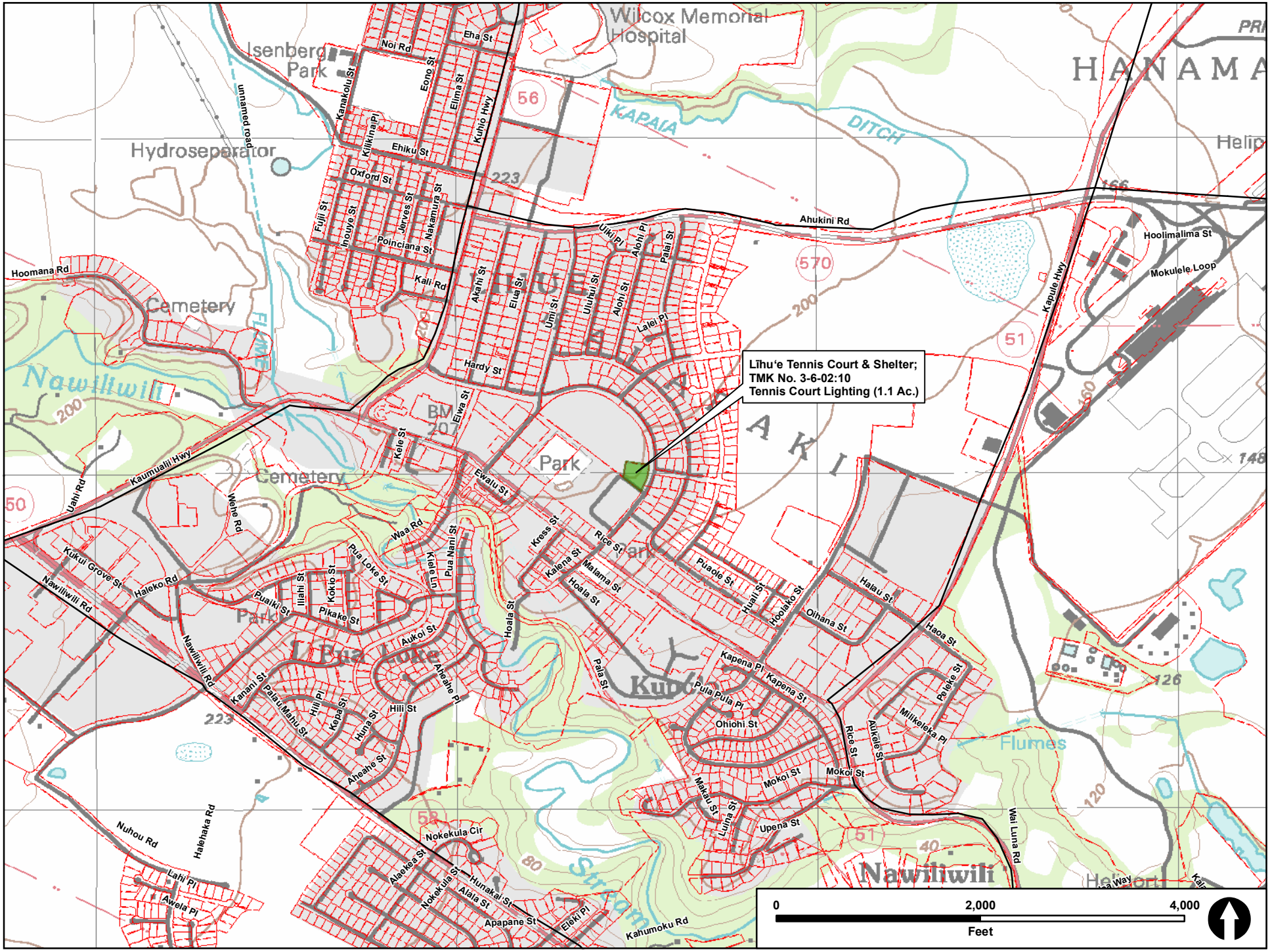
-9 x Sodium Flood Lights

-14 x Fluorescent Lights

-17 x Incandescent Lighs

-Lights are used only as needed.

Līhue Sewage Treatment Plant 2010-03-30.cdr



Lihue Tennis Court & Shelter 2010-03-23.mxd

Facility Name:

Līhu'e Tennis Courts & Shelter

Facility Type:

Neighborhood Park (Type IV)

Size:

1.1 Ac.

TMK Parcel No.:

3-6-02:10

Facility Lighting:

Yes

Lighting Controls:

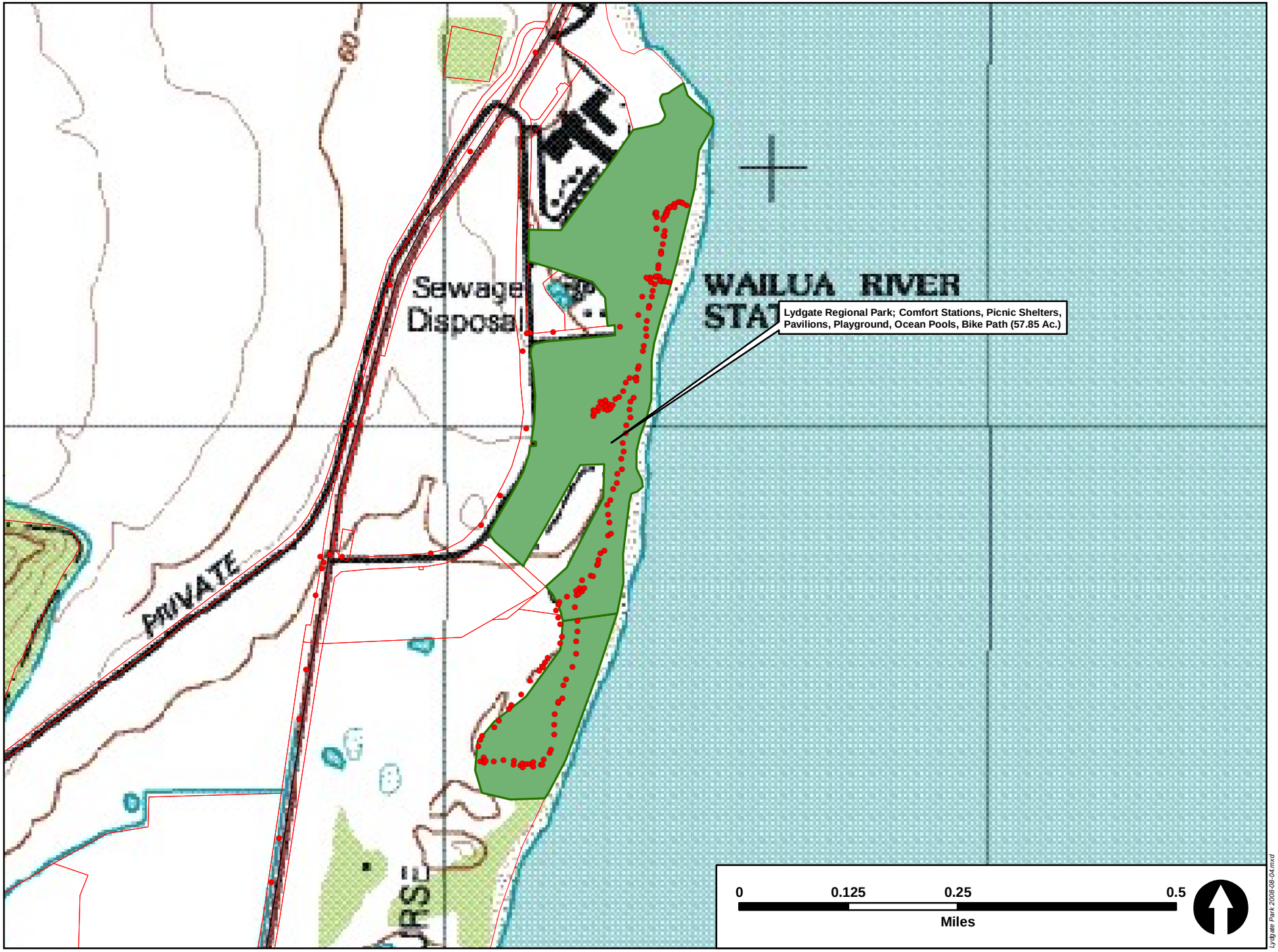
Programmed online.

Lighting Information:

-12 x 1,000 watt Court Lights

-Lights are on daily until 10:00 PM, and until 8:00 PM during fallout season.

Lihue Tennis Court & Shelter 2016-08-02.cdr


Sewage
Disposal
WAILUA RIVER
STAT
Lydgate Regional Park; Comfort Stations, Picnic Shelters, Pavilions, Playground, Ocean Pools, Bike Path (57.85 Ac.)
PRIVATE
0
0.125
0.25
0.5
Miles
Lydgate Park 2008-08-04.mxd

Facility Name:	TMK Parcel No.:	Lighting Information:
Lydgate Park	3-9-60:01	-Lydgate park consists of a complex of comfort stations, picnic shelters, pavilions, and ocean pools connected by bike/jogging paths.
Facility Type:	**Facility Lighting:**	
Regional Park (Type I)	Yes	
Size:	**Lighting Controls:**	
57.85 Ac.	Staff Operated	

Lydgate Park 2008-08-04.cdr

Peter Rayno Lihue Park 2008-07-24.mxd

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 Controls:

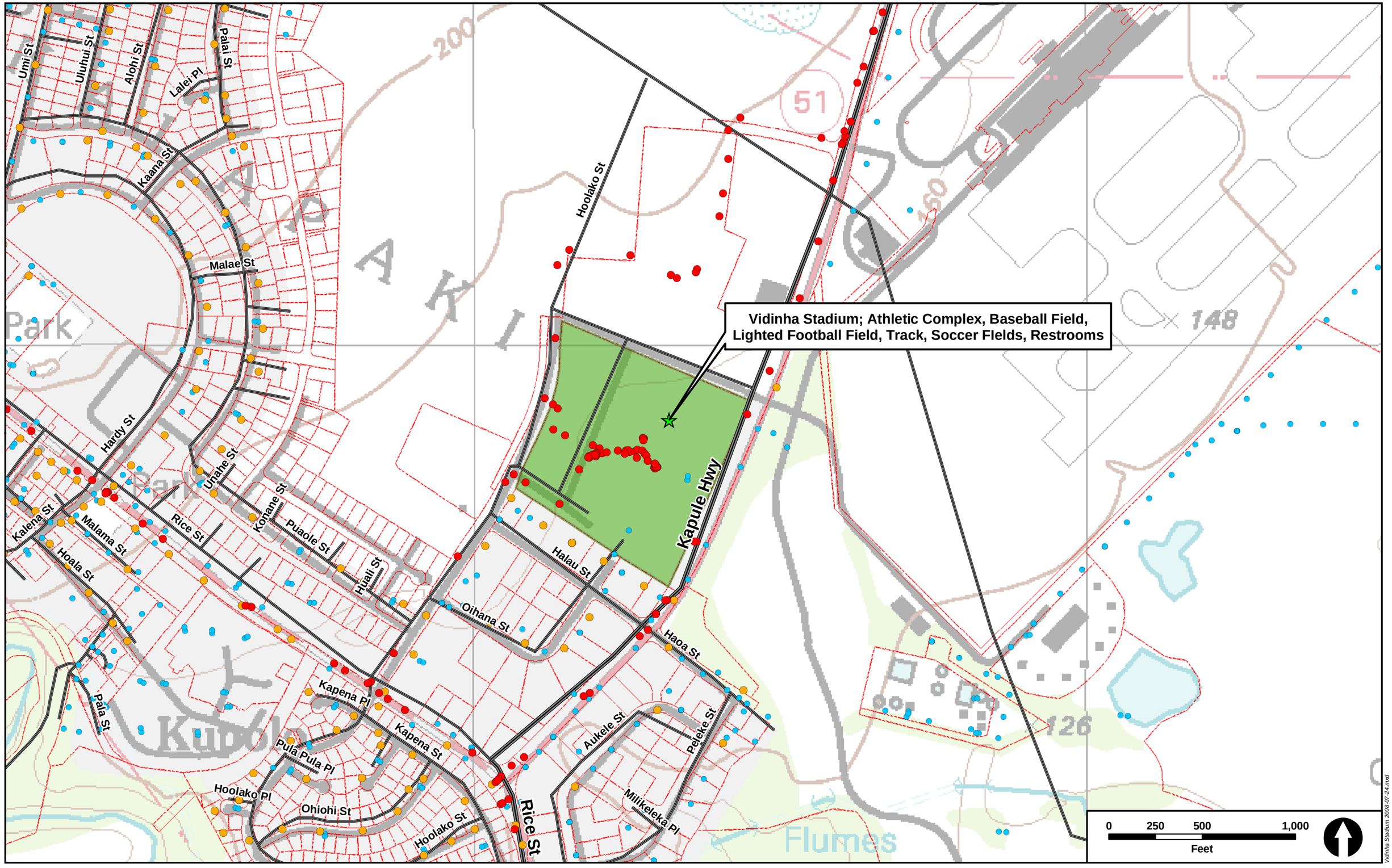
Manually operated by staff.

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.

Peter Rayno Hanamaulu Park 2016-08-02.cdr



Vidinha Stadium 2008-07-24.mxd

Facility Name:

Vidinha Stadium

Facility Type:

Stadium & District Park (Type I)

Size:

34 Acres

TMK Parcel No.:

3-6-02:16 & 3-6-02:19

Facility Lighting:

Yes

Lighting Controls:

-Stadium and baseball field controlled by staff.
-Parking lighting is automatic.

Lighting Information:

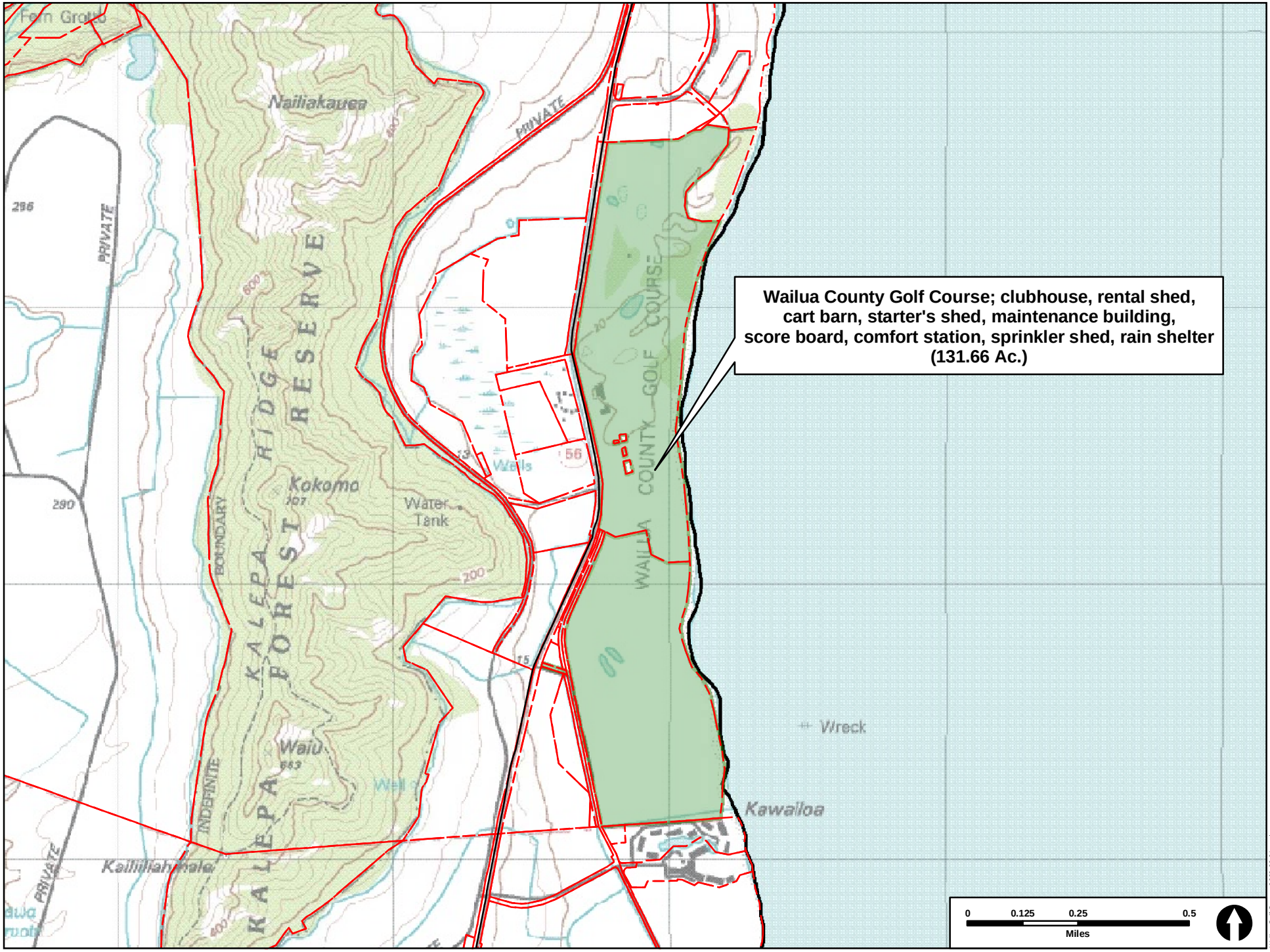
-Parking area has 23 poles with streetlight-type lighting, with 1-2 lights per pole.

-Stadium has six large poles with 18 floodlights each.

-Entrance lighting consists of 6 lights contained within a tinted plexiglass lampshade.

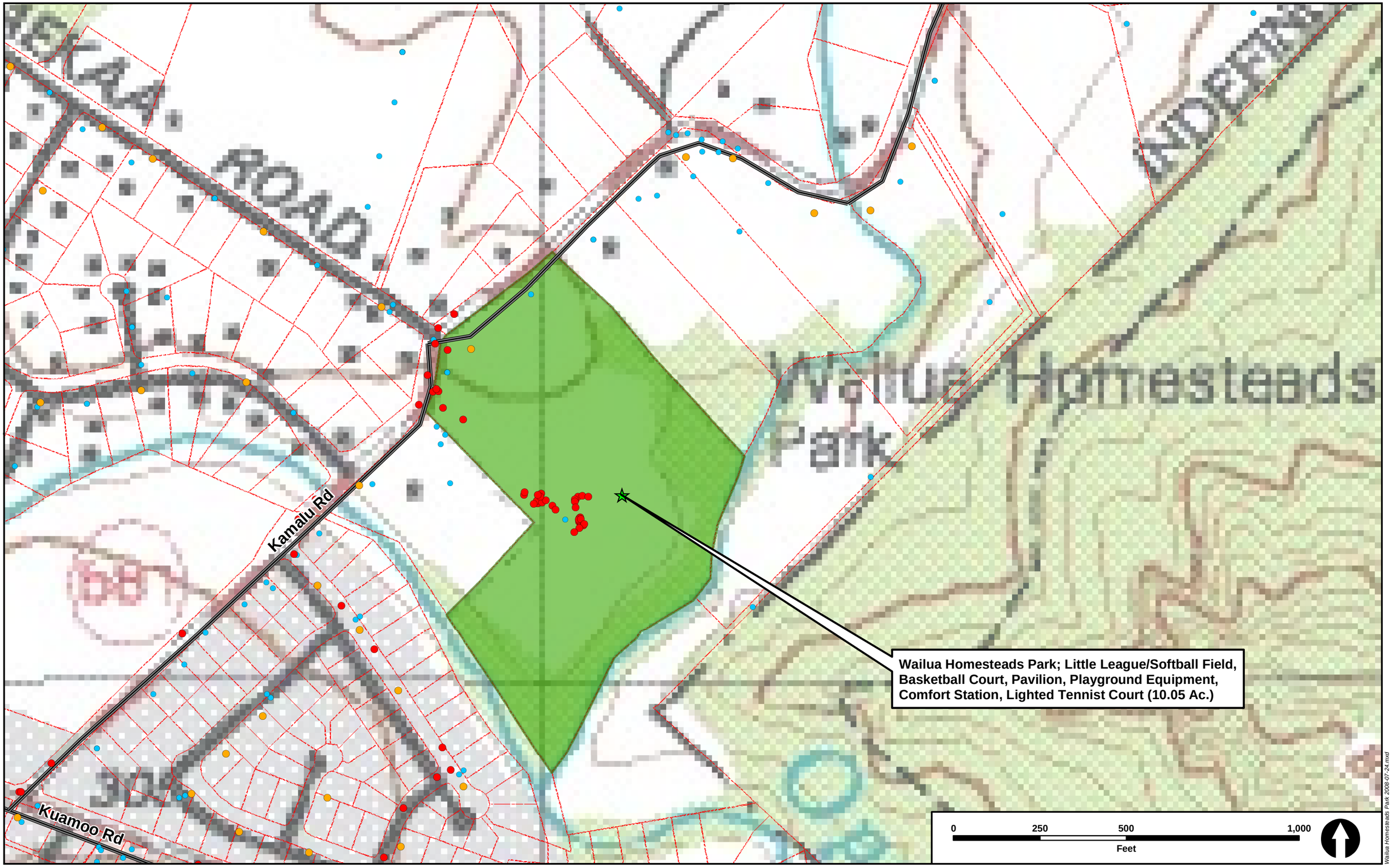
-The stadium building is lit with external and internal fluorescent lights, seven per side.

Vidinha Stadium Facility Sheet 2016-08-02.cdr


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.)
Fern Grotto
Nailiakauea
PRIVATE
296
290
KALEPA RIDGE FOREST RESERVE
KALEPA FOREST
INDEFINITE BOUNDARY
Kokomo
Water Tank
Wells
56
WAILUA COUNTY GOLF COURSE
Waiu
Well
Kailiilahanala
Wreck
Kawailoa
0
0.125
0.25
0.5
Miles
Wailua Golf Course 2009-09-01.mxd

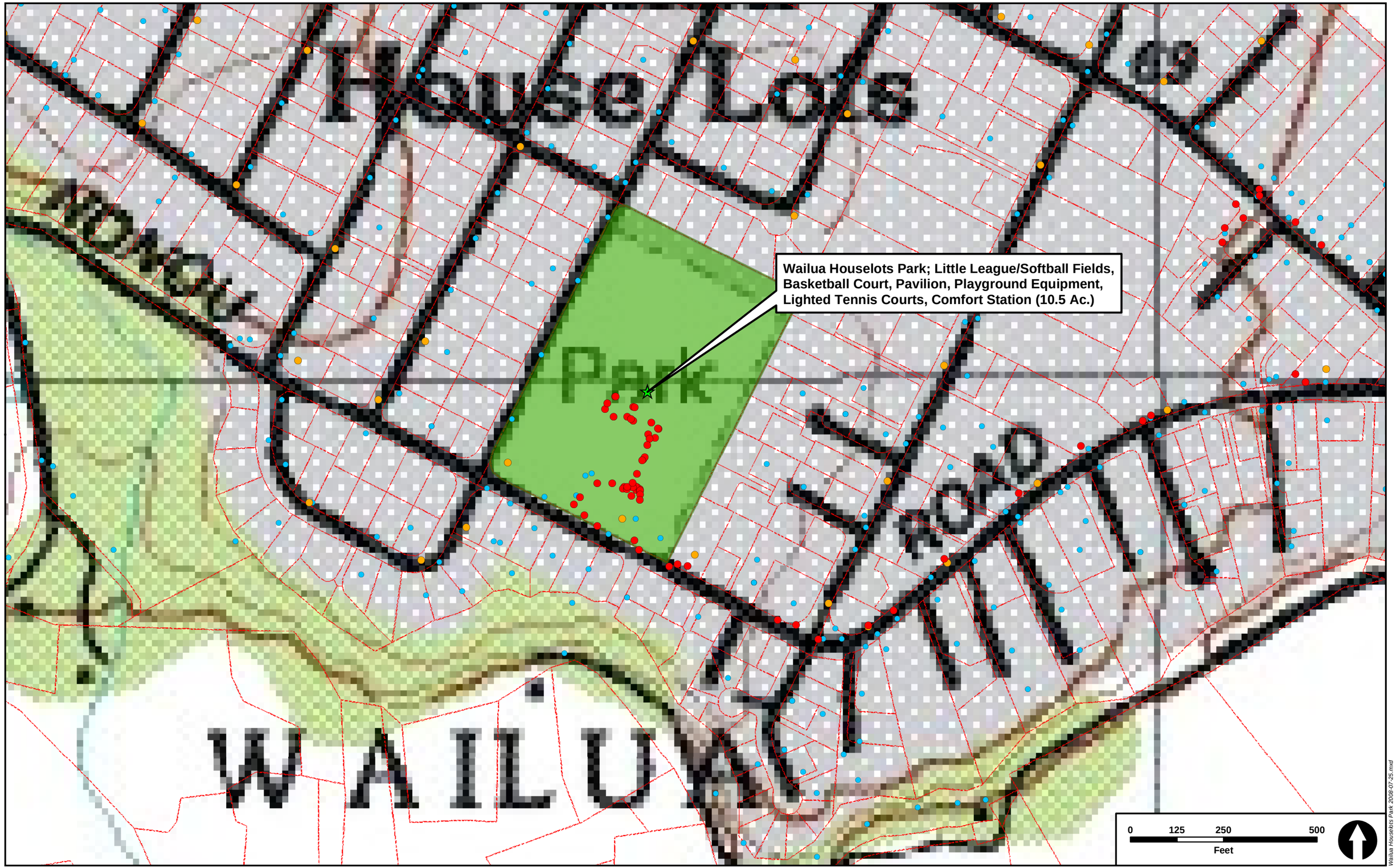
Facility Name:	TMK Parcel No.:	Lighting Information:
Wailua County Golf Course	3-9-2:4 & 3-9-5:1	-Lit facilities at Wailua County Golf Course include the clubhouse, rental shed, cart barn, starter's shed, maintenance building, score board.
Facility Type:	**Facility Lighting:**	
Golf Course	Yes	
Size:	**Lighting Controls:**	
131.66 Ac.	Staff Operated	

Wailua Golf Course 2016-08-05.cdr

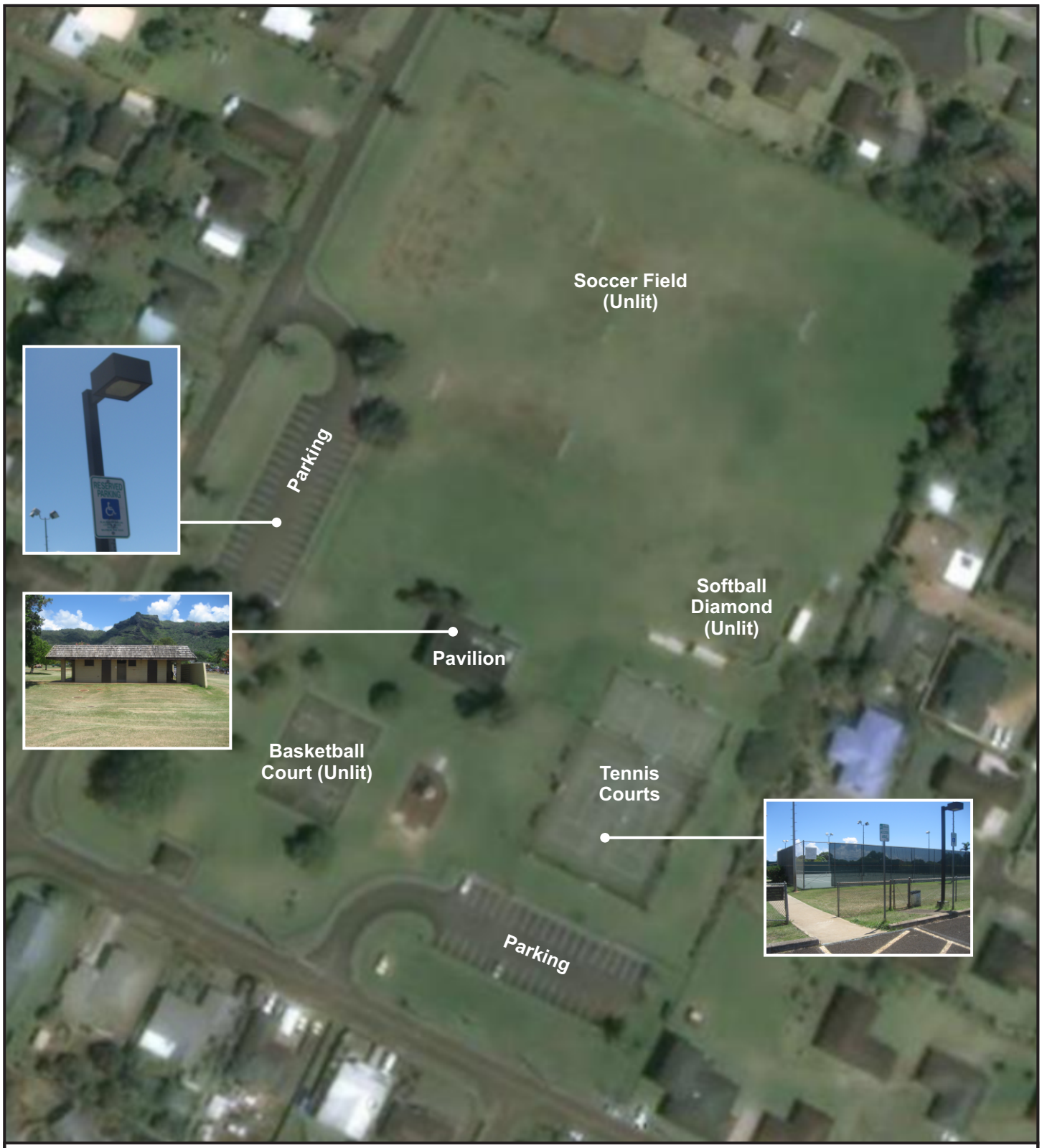

ROAD
Kamalu Rd
Kuamoo Rd
Wailua Homesteads
Park
Wailua Homesteads Park; Little League/Softball Field, Basketball Court, Pavilion, Playground Equipment, Comfort Station, Lighted Tennist Court (10.05 Ac.)
0
250
500
1,000
Feet
Wailua Homesteads Park 2008-07-24.mxd

Facility Name:	TMK Parcel No.:	Lighting Information:
Wailua Homesteads Park	4-2-03:18	-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.
Facility Type:	**Facility Lighting:**	
Neighborhood Park (Type III)	Yes	
Size:	**Lighting Controls:**	
16.63 Acres	Programmed Online and Manual	

Wailua Homesteads Park Facility Sheet 2016-08-02.cdr



Wailua Houselots Park 2008-07-25.mxd



Facility Name:

Wailua Houselots Park

Facility Type:

Neighborhood Park (Type III)

Size:

10.05 Acres

TMK Parcel No.:

4-1-16:42

Facility Lighting:

Yes

Lighting Controls:

-Pavilion is manual; tennis court is programmed online or turned on by user.
-Parking area has 10:00PM timed shut off.

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 Houselots Park Facility Sheet 2016-08-02.cdr

Wailea Sewage Treatment Plant 2010-03-23.mxd

Facility Name:

Wailua Sewage Treatment Plant

Facility Type:

Sanitation

Size:

2.03 Ac.

TMK Parcel No.:

3-9-06:19

Facility Lighting:

Yes

Lighting Controls:

Unknown

Lighting Information:

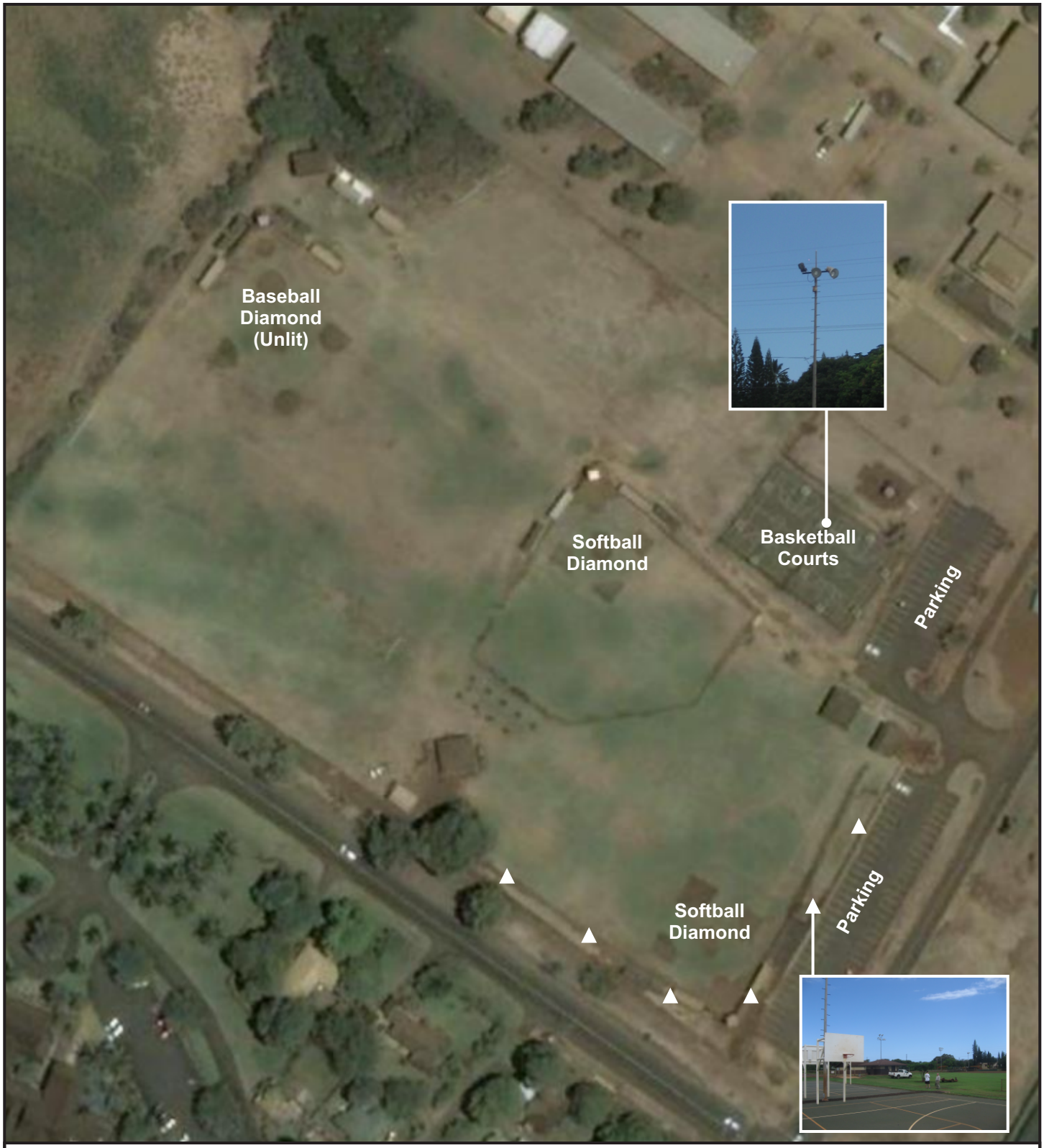
-12 x Sodium Parking Lights

-2 x Sodium Floodlights

-2 x Flourescent Building Lights

-Floodlights are on all night, all other lights are only used during emergencies or special events.

Wailua Sewage Treatment Plant 2010-03-25.cdr



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 Controls:

-Softball by permit.
-Basketball on demand.
-All others programmed online.

Lighting Information:

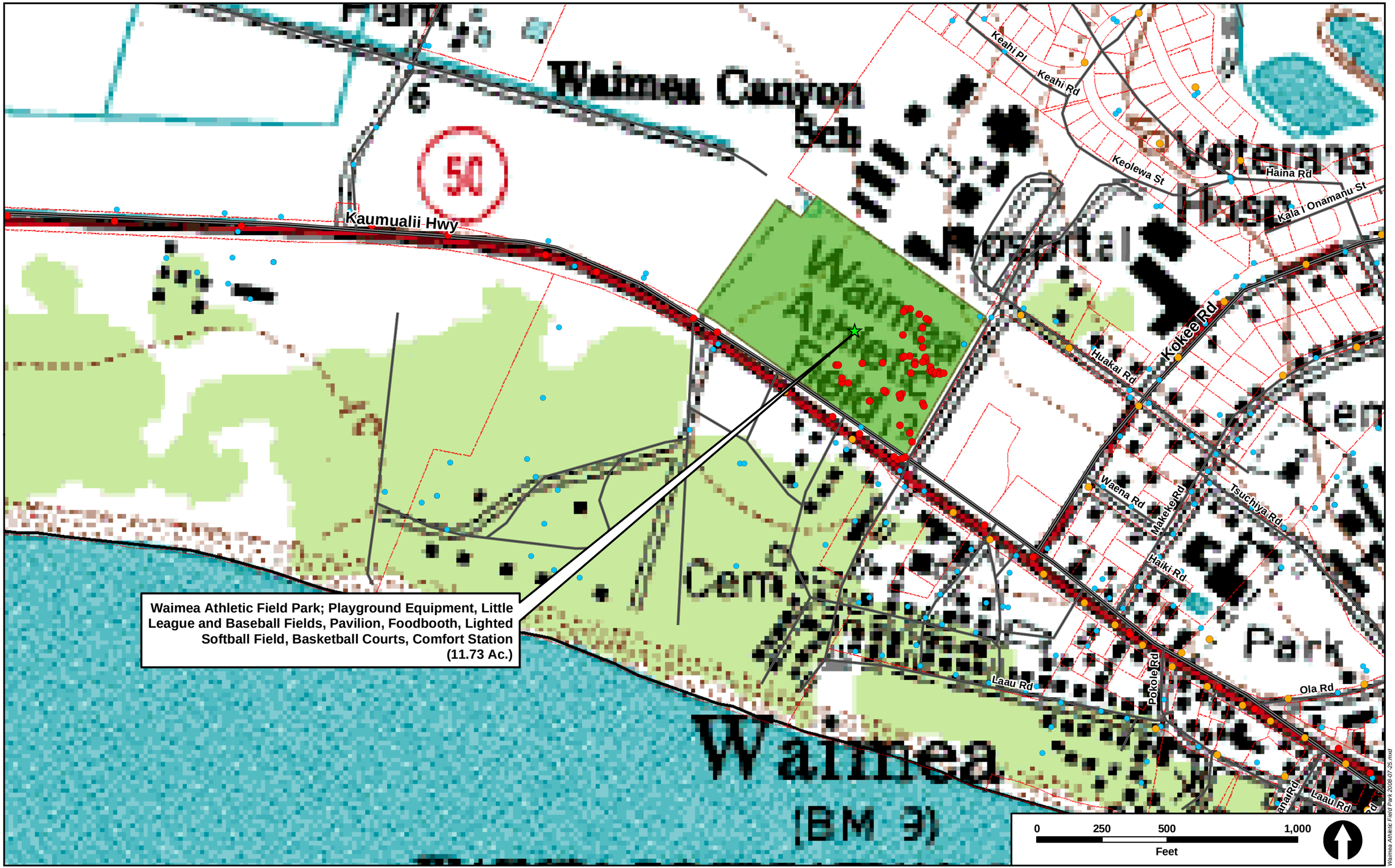
-Softball diamond is lit with 6 poles of 2-6 floodlights each.

-Basketball court is illuminated by 4 poles with 2 street-lights each.

-Comfort station and pavilion are lit with strip fluorescent lighting.

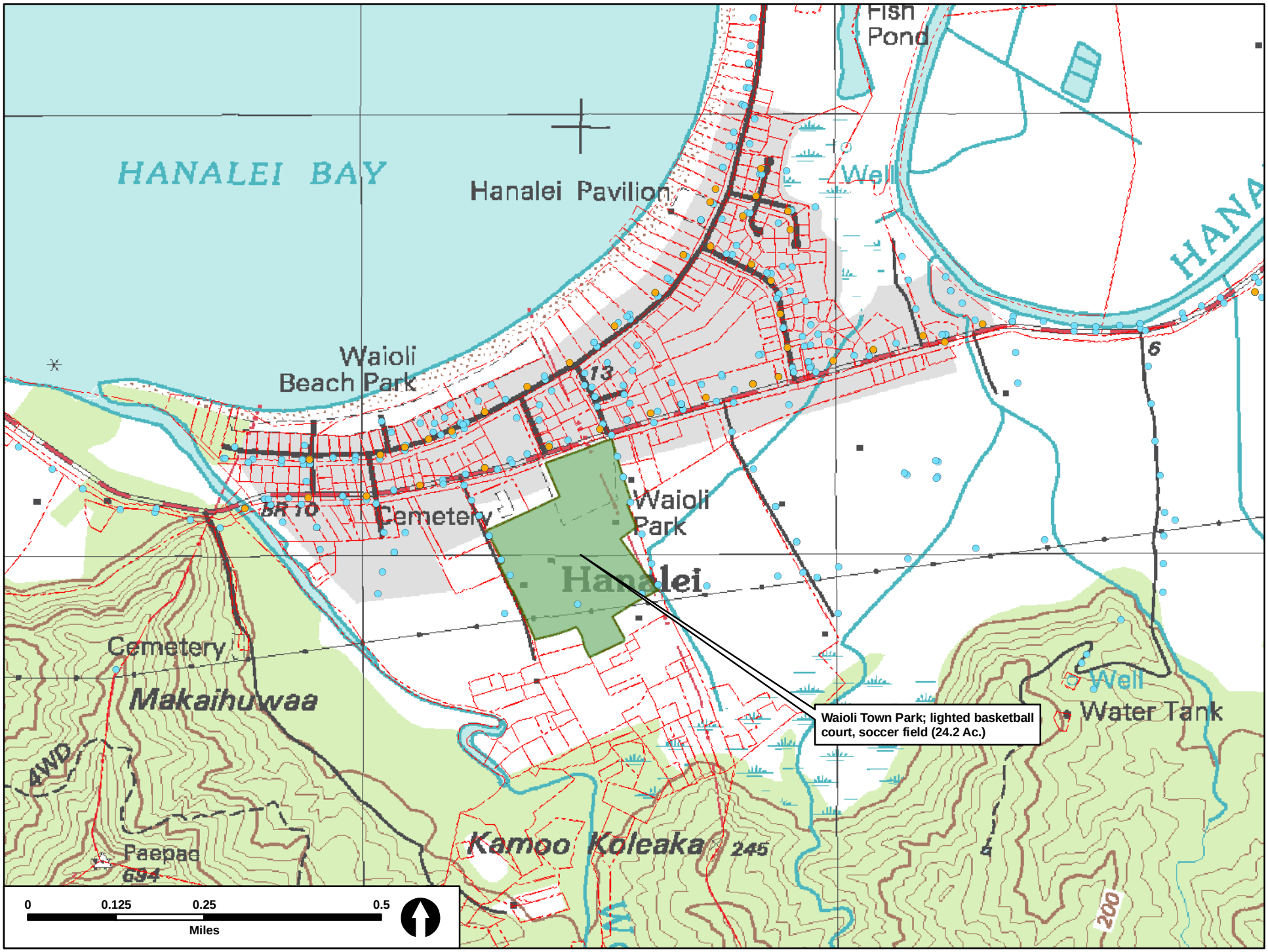
-Other facilities are unlit.

Waimea Athletic Field 2016-08-02.cdr



Waimea Athletic Field Park; Playground Equipment, Little League and Baseball Fields, Pavilion, Foodbooth, Lighted Softball Field, Basketball Courts, Comfort Station (11.73 Ac.)

Waimea Athletic Field Park 2008-07-25.mxd



Survey of Kauai County Parks 2008-08-06.mxd

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

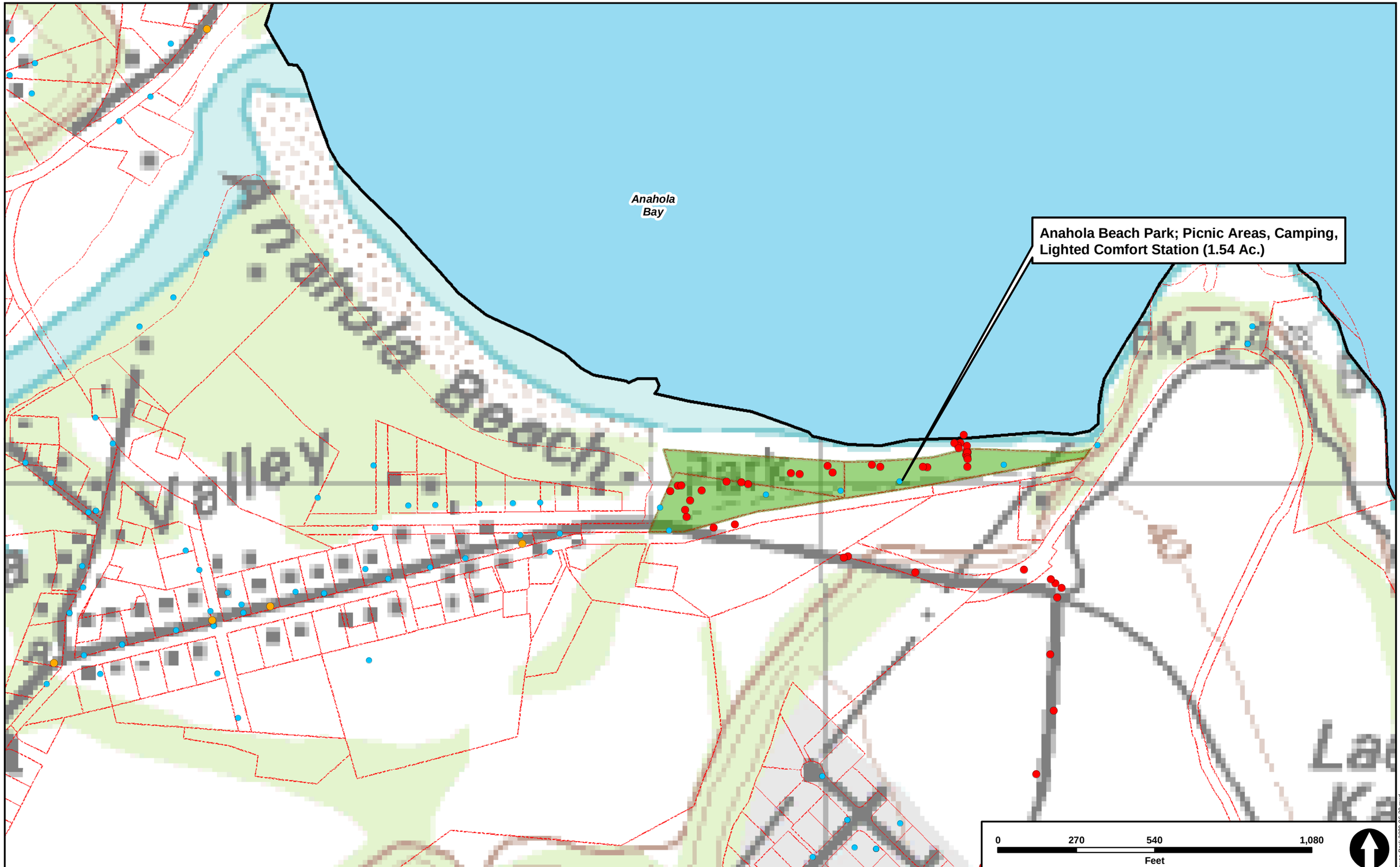
Lighting Controls:

n/a

Lighting Information:

-The basketball court and soccer field are now unlit. The poles were removed in February, 2016.

Waioli Town park 2016-08-02.cdr



Kilauea Park 2008-06-20.mxd

Facility Name:

Anahola Beach Park

Facility Type:

Beach Park

Size:

Unknown

TMK Parcel No.:

4-8-14:06

Facility Lighting:

Yes

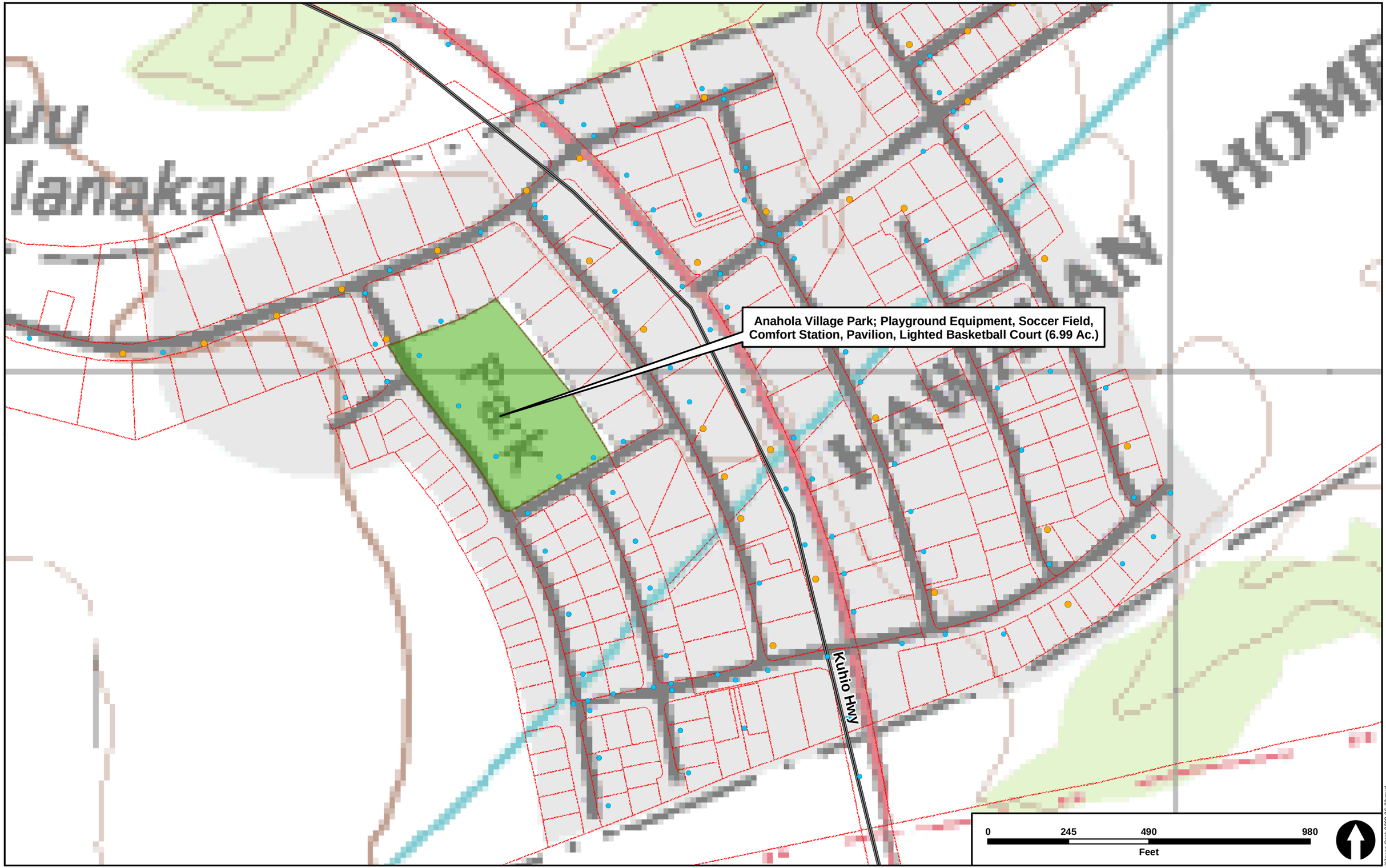
Lighting Controls:

Manual

Lighting Information:

-The comfort station is lit by interior and exterior fluorescent lights.

Anahola Beach Park Facility Sheet 2008-07-29.cdr



Kilauea Park 2008-06-20.mxd

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.

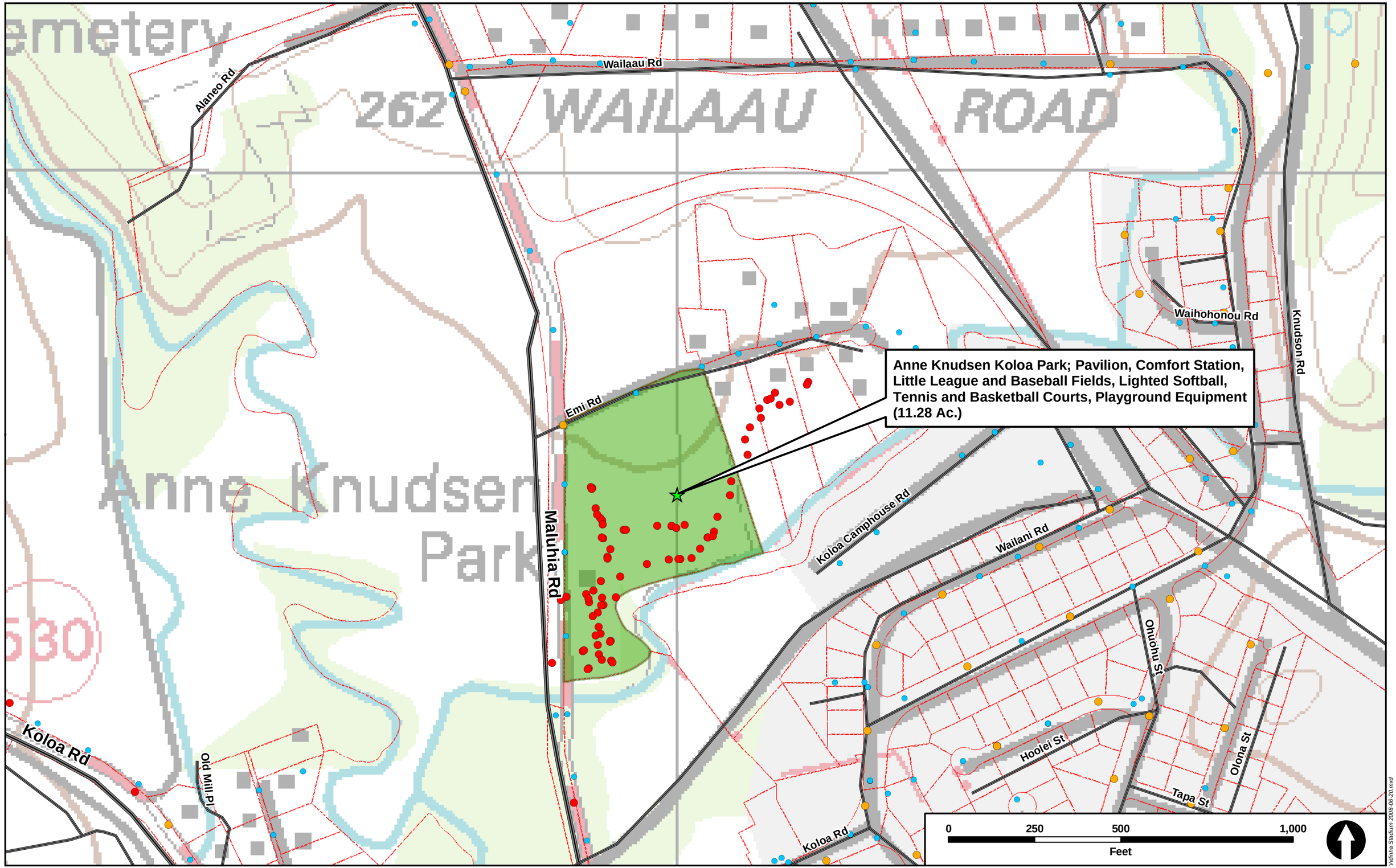
Lighting Information:

-Pavilion and comfort station have external and internal fluorescent lighting.

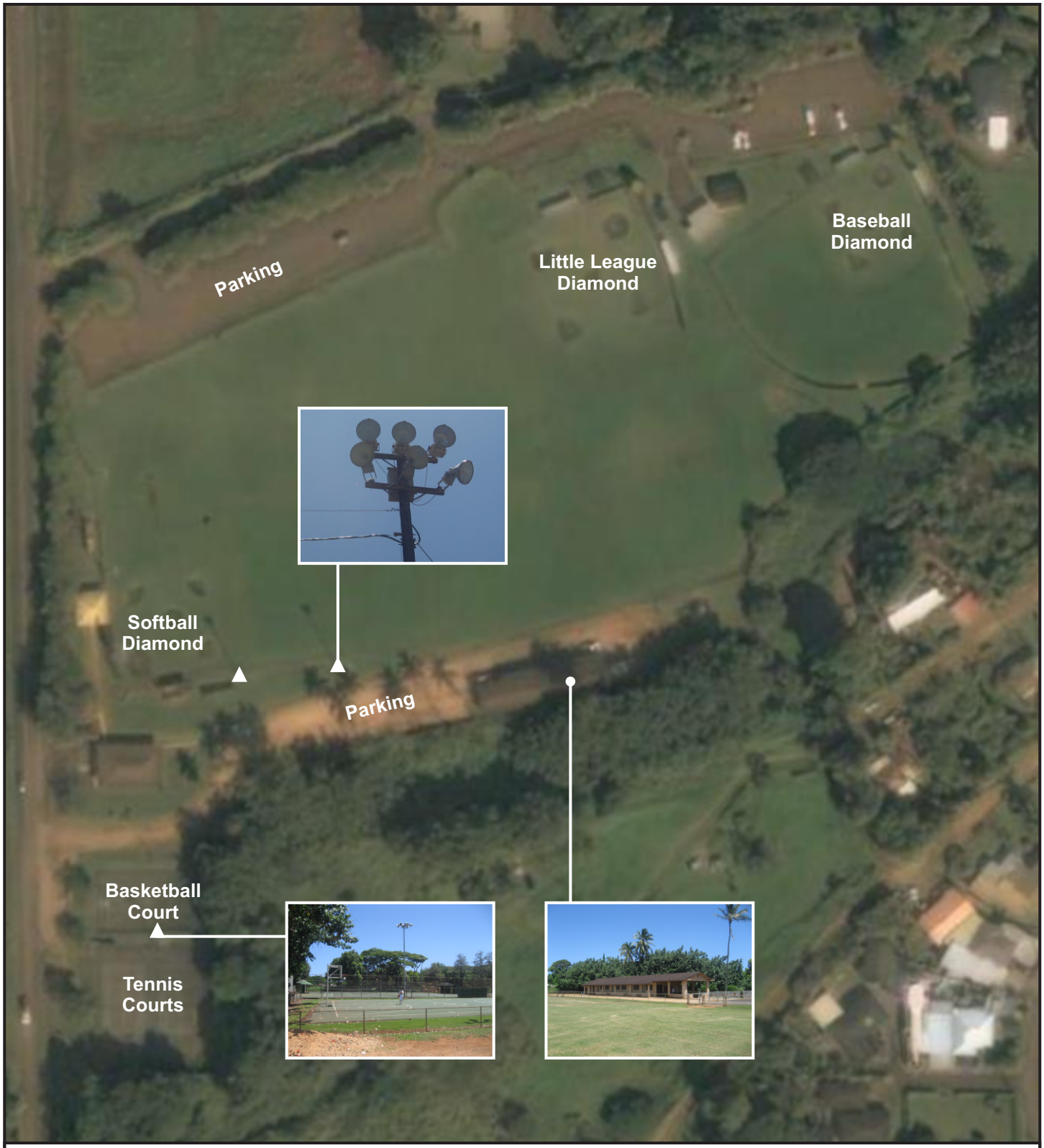
-Basketball court has two poles with two fixtures each; all are shielded.

-Play field and playground are unlit.

Anahola Village Park Facility Sheet 2016-08-02.cdr



Vidinha Stadium 2008-06-20.mxd



Facility Name:

Anne Knudsen Koloa Park

Facility Type:

District Park (Type II)

Size:

11.28 Acres

TMK Parcel No.:

2-8-05:04, 2-8-05:17, 18, & 19

Facility Lighting:

Yes

Lighting Controls:

-Tennis and basketball programmed online.
-Softball programmed online by permit.

Lighting Information:

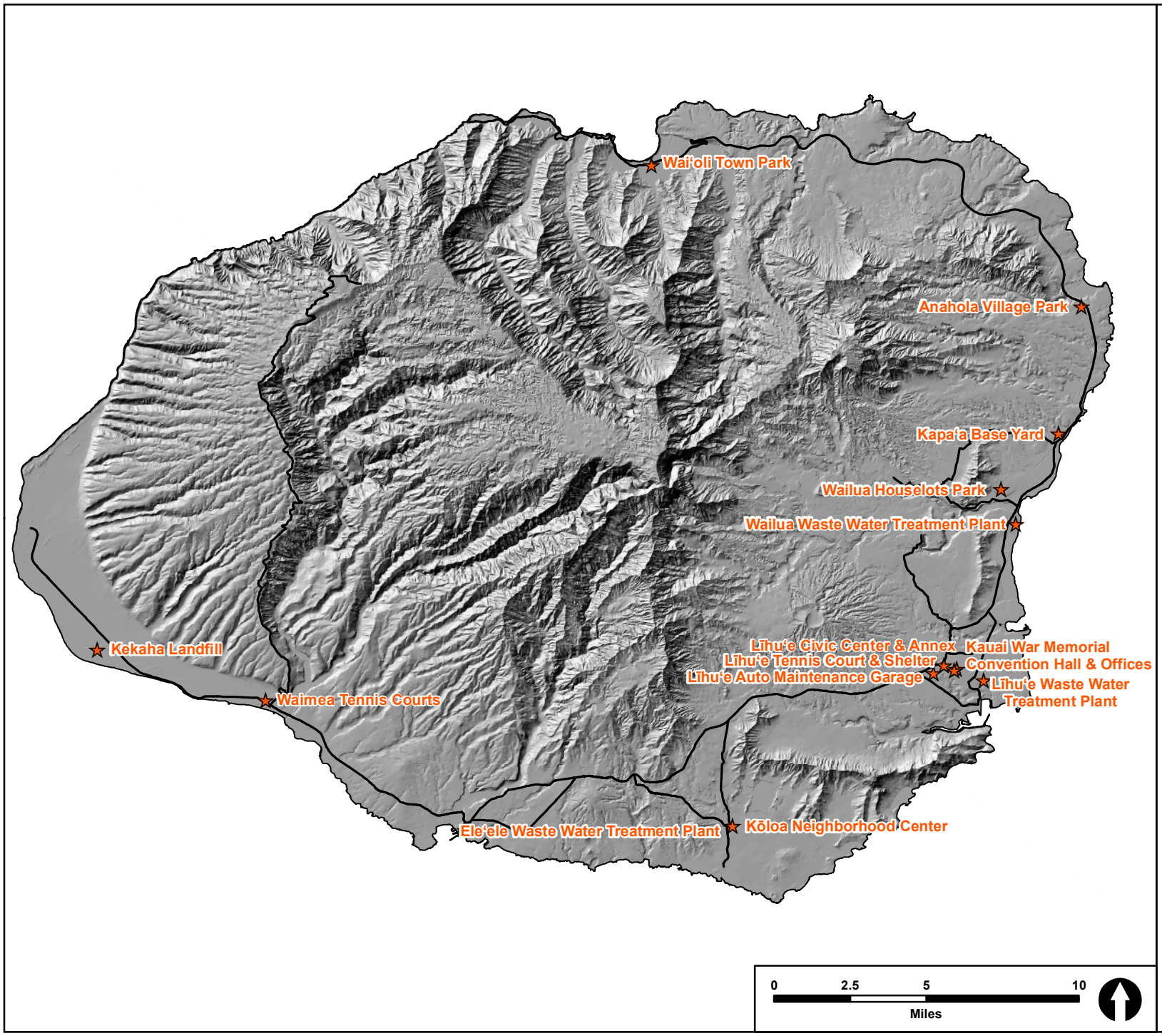
-Baseball diamond is lit by 6 poles with 3-5 floodlights each.

-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.

Anne Knudsen Koloa Park Facility Sheet 2016-08-02.cdr



Legend:

County Facilities in Category 4: Exterior Area & Court Lights

Prepared For:

County of Kauai

Prepared By:

PLANNING SOLUTIONS

Source::

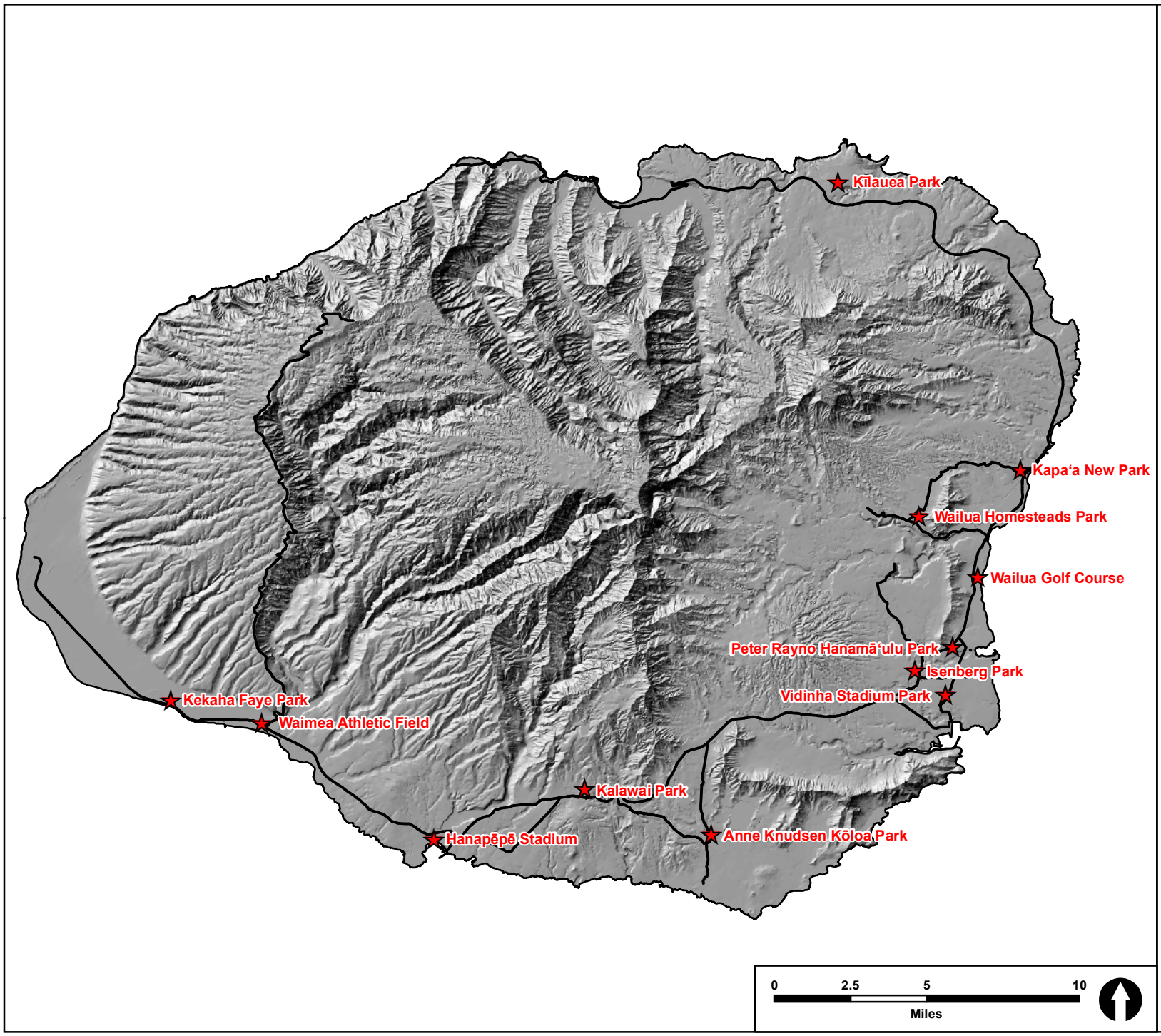
-State of Hawaii GIS
-Planning Solutions, Inc.

Figure:

Locations of Category 4 Facilities

Kauai County Habitat Conservation Plan

Category 4 County Facilities 2011-01-17.mxd



Legend:

County Facilities in Category 5: Field & Stadium Lighting

Prepared For:

County of Kauai

Prepared By:

PLANNING SOLUTIONS

Source::

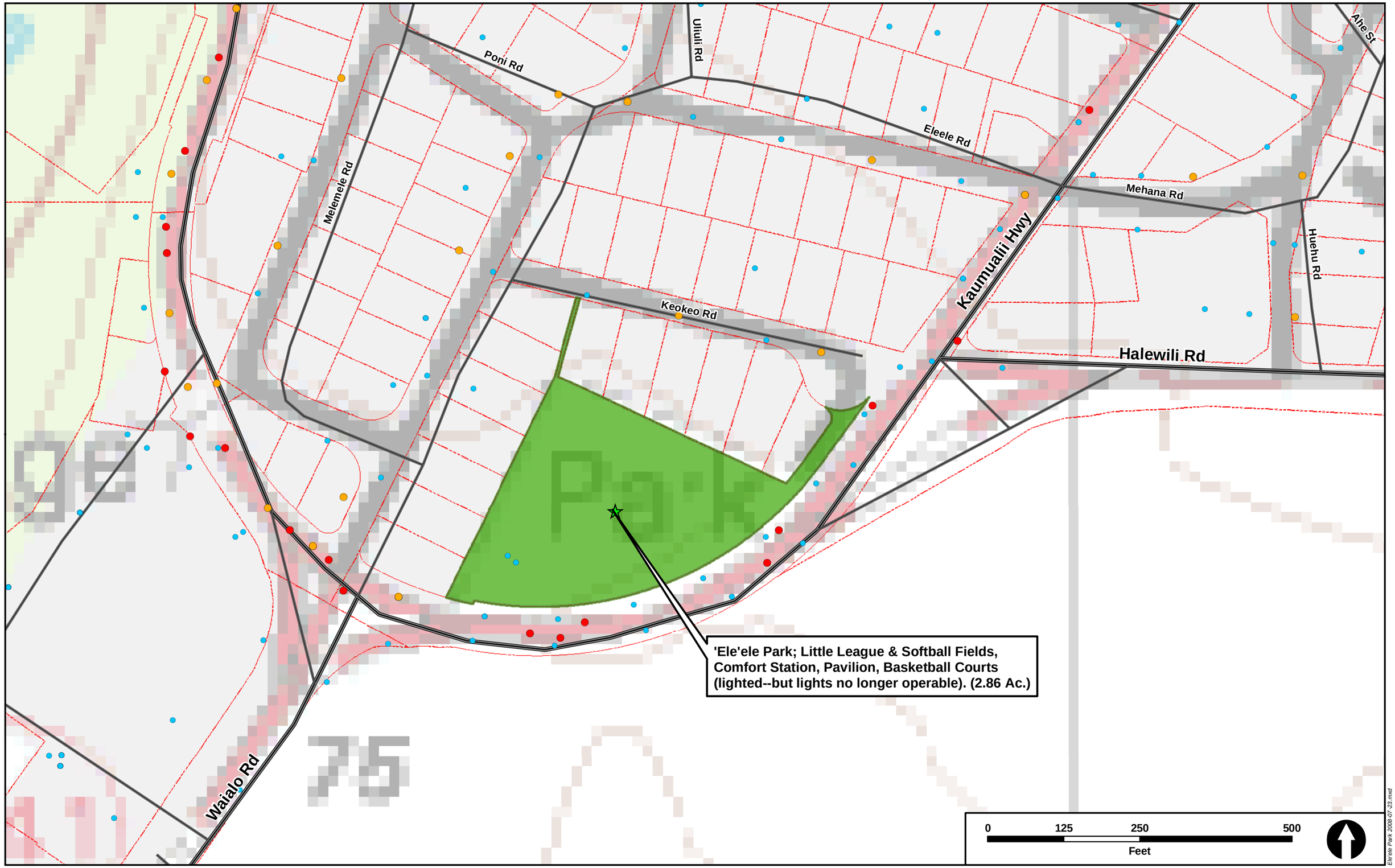
-State of Hawaii GIS
-Planning Solutions, Inc.

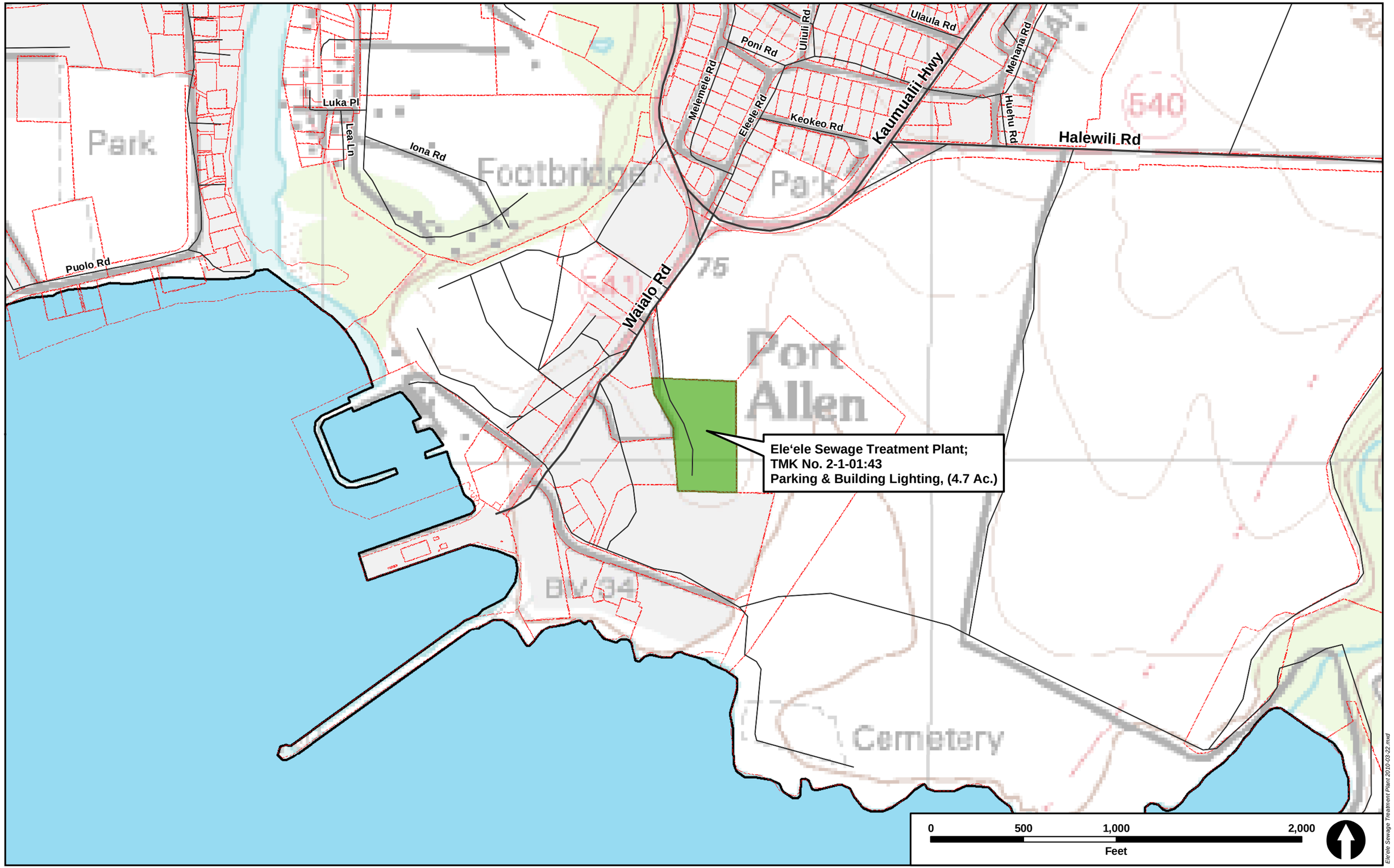
Figure:

Locations of Category 5 Facilities

Kauai County Habitat Conservation Plan

Category 5 County Facilities 2011-01-17.mxd


Poni Rd
Ululi Rd
Eleele Rd
Ahe St
Mehana Rd
Melemele Rd
Kaumualii Hwy
Huehu Rd
Keokeo Rd
Halewili Rd
Waialo Rd
'Ele'ele Park; Little League & Softball Fields, Comfort Station, Pavilion, Basketball Courts (lighted--but lights no longer operable). (2.86 Ac.)
0
125
250
500
Feet
Ele'ele Park 2008-07-23.mxd


Ele'ele Sewage Treatment Plant;
TMK No. 2-1-01:43
Parking & Building Lighting, (4.7 Ac.)
Park
Luka Pl
Lea Ln
Iona Rd
Footbridge
Park
Puolo Rd
Waialo Rd
Melemele Rd
Eleele Rd
Poni Rd
Uliuli Rd
Ulaula Rd
Keokeo Rd
Kaumualii Hwy
Mehana Rd
Huehu Rd
Halewili Rd
540
75
Port
Allen
BW 34
Cemetery
0
500
1,000
2,000
Feet
Ele'ele Sewage Treatment Plant 2010-03-22.mxd

Facility Name:	TMK Parcel No.:	Lighting Information:
Ele'ele Sewage Treatment Plant	2-1-01:43	-14 x Sodium Parking Lights
Facility Type:	**Facility Lighting:**	-4 x Sodium Flood Lights
Sanitation	Yes	-6 x Exterior Wall Fixtures
Size:	**Lighting Controls:**	
4.7 Ac.	Unknown	

Ele'ele Sewage Treatment Plant 2010-03-29.cdr

Facility Name:

Haena Beach Park

Facility Type:

Beach Park

Size:

Unknown

TMK Parcel No.:

Unknown

Facility Lighting:

Yes

Lighting Controls:

Manual

Lighting Information:

-The comfort station is lit by interior and exterior fluorescent lights.

Haena Beach Park Facility Sheet 2008-07-23.cdr

Facility Name:

Hanalei Pavilion Park

Facility Type:

Beach Park

Size:

Unknown

TMK Parcel No.:

5-5-002:019

Facility Lighting:

Yes

Lighting Controls:

Manual

Lighting Information:

-Pavilion and comfort station are lit by interior and exterior fluorescent lights.

Hanalei Pavilion 2008-07-30.cdr

Facility Name:

Hanalei Refuse Transfer Station

Facility Type:

Transfer Station

Size:

1.454 Ac.

TMK Parcel No.:

5-3-01-17

Facility Lighting:

Yes

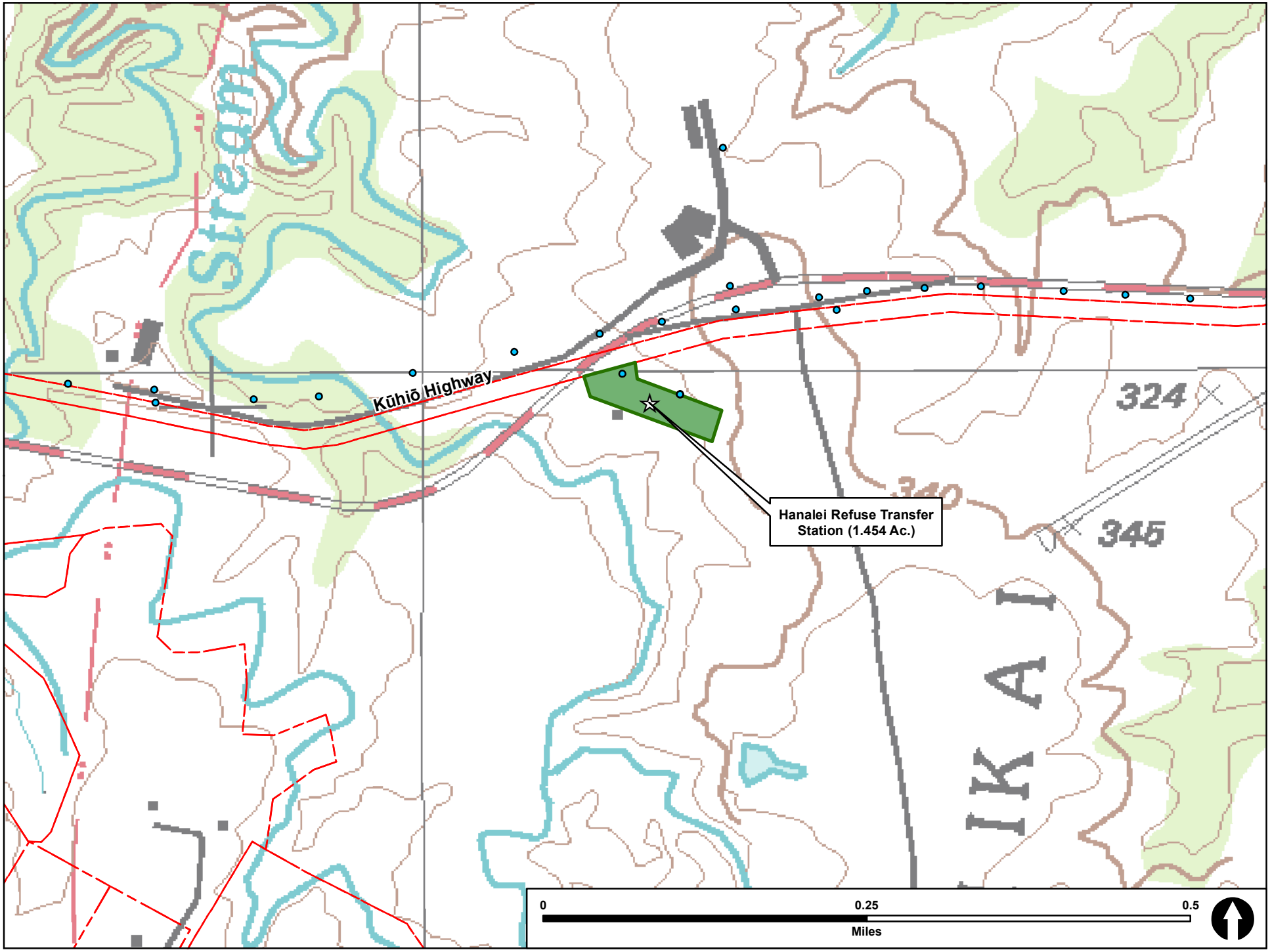
Lighting Controls:

Manual

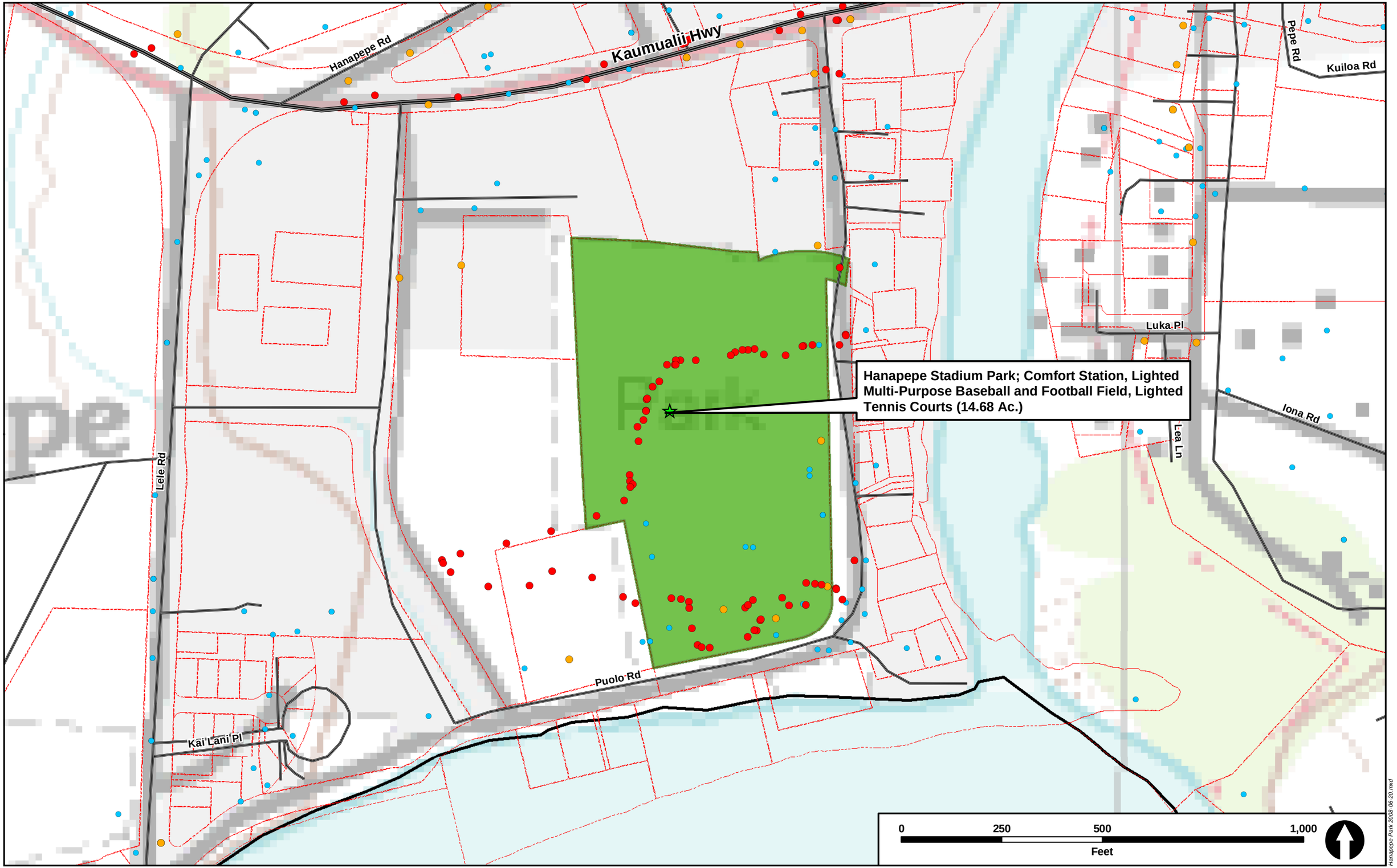
Lighting Information:

-The compactor area, comfort station and sheds have external lighting.

Hanalei Refuse Transfer Station 2009-08-31.cdr



Hanalei Refuse Transfer Station.mxd


Hanapepe Rd
Kaumualii Hwy
Pepe Rd
Kuiloa Rd
Luka Pl
Hanapepe Stadium Park; Comfort Station, Lighted Multi-Purpose Baseball and Football Field, Lighted Tennis Courts (14.68 Ac.)
Iona Rd
Lea Ln
Lele Rd
Puolo Rd
Kai'Lani Pl
0
250
500
1,000
Feet
Hanapepe Park 2008-06-20.mxd

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 Controls:

-Football field is manual by permit.
-Tennis court programmed online and manually by users.

Lighting Information:

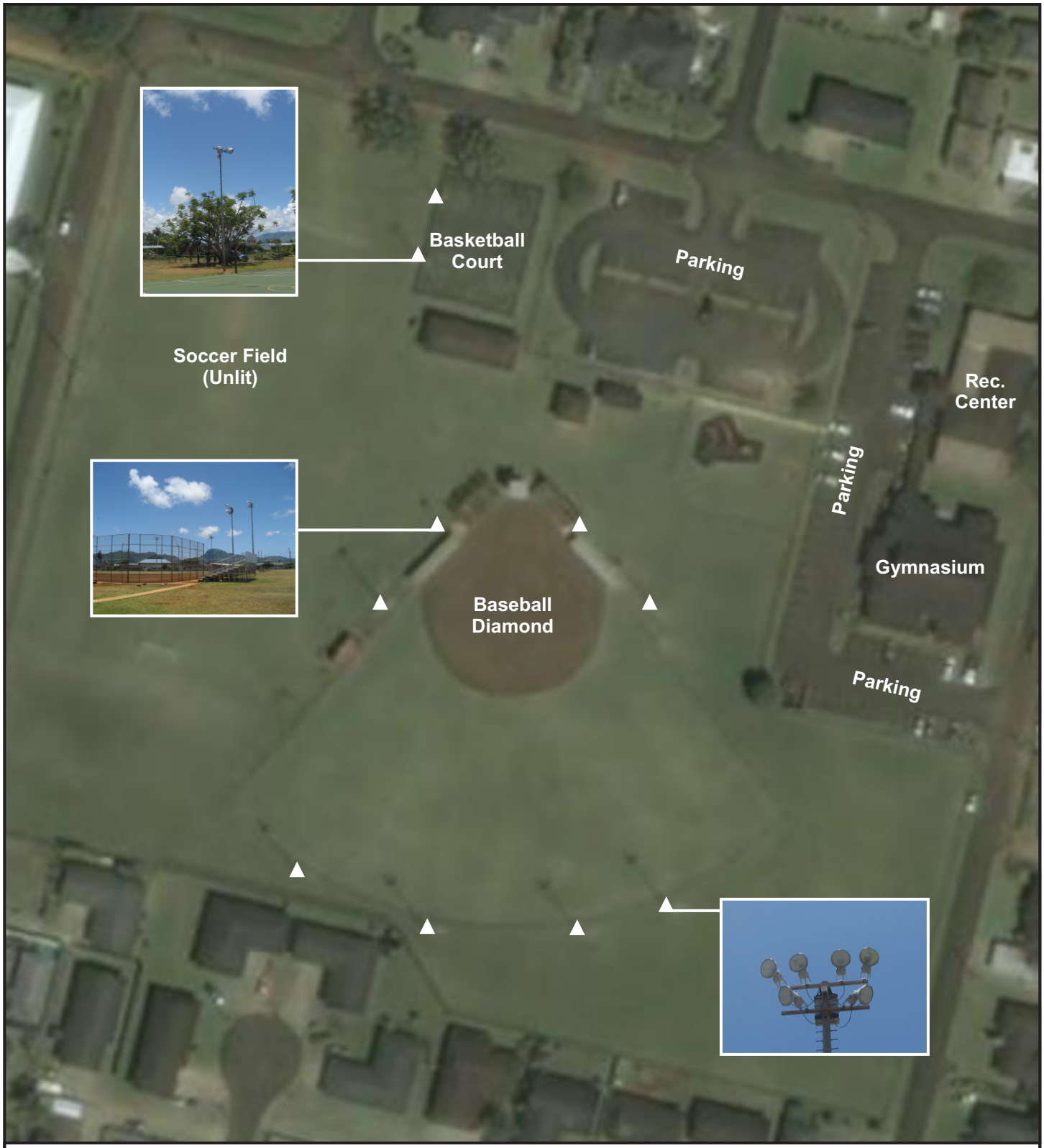
-Football & baseball fields are each illuminated by 6 poles carrying ~14 floodlights per pole.

-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.

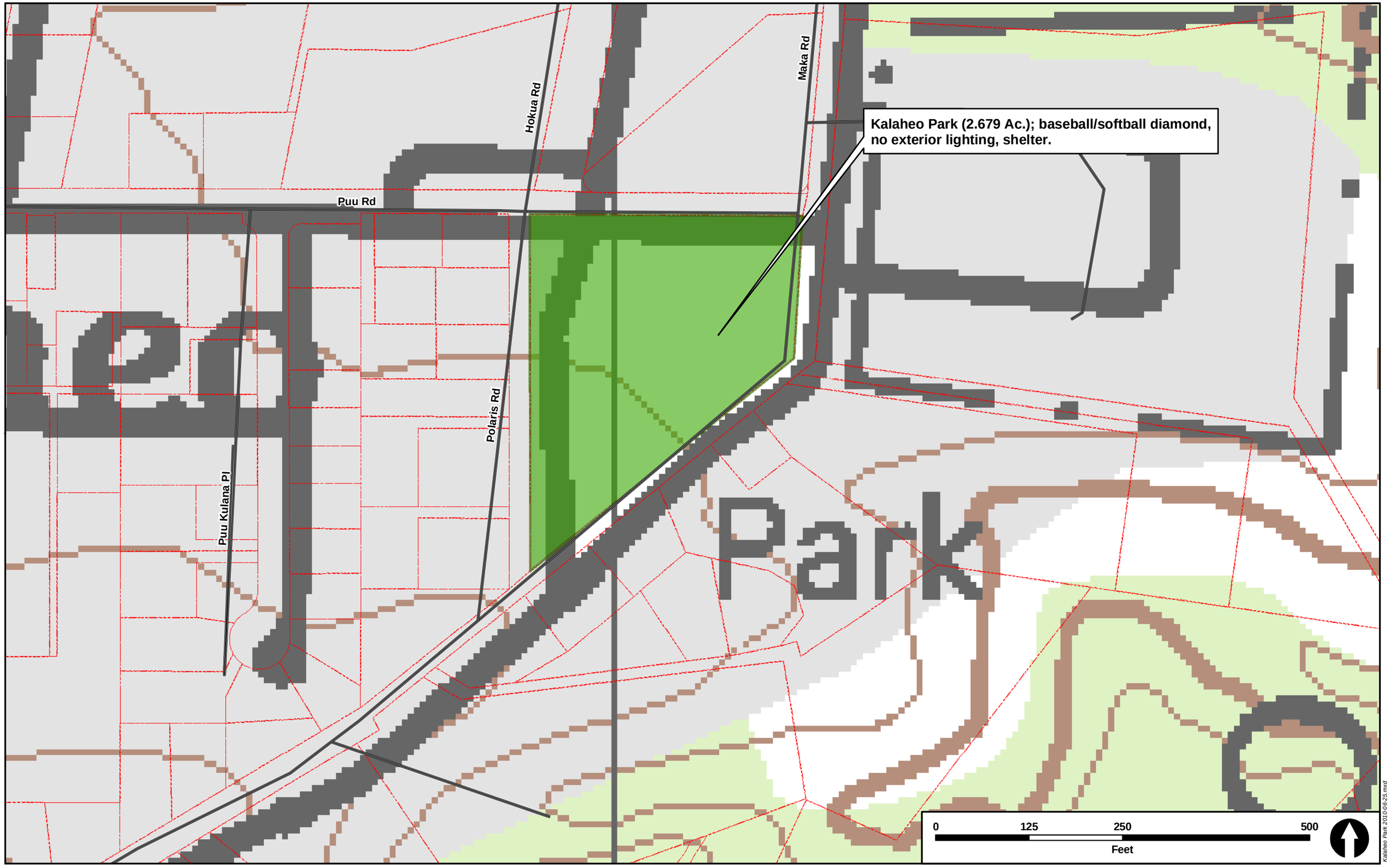
Hanapepe Park Facility Sheet 2016-08-02.cdr

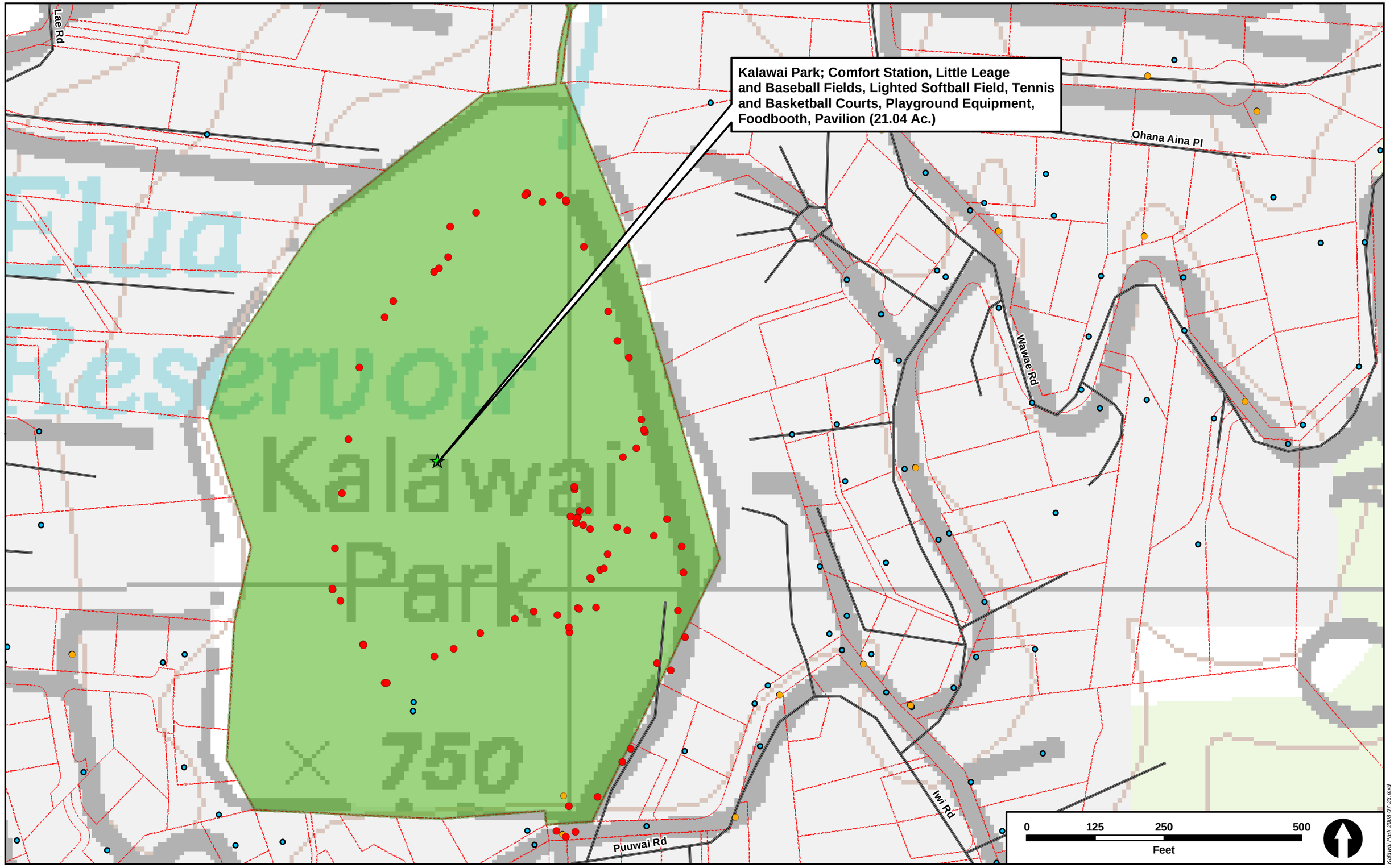
Isenberg Park 2008-07-23.mxd

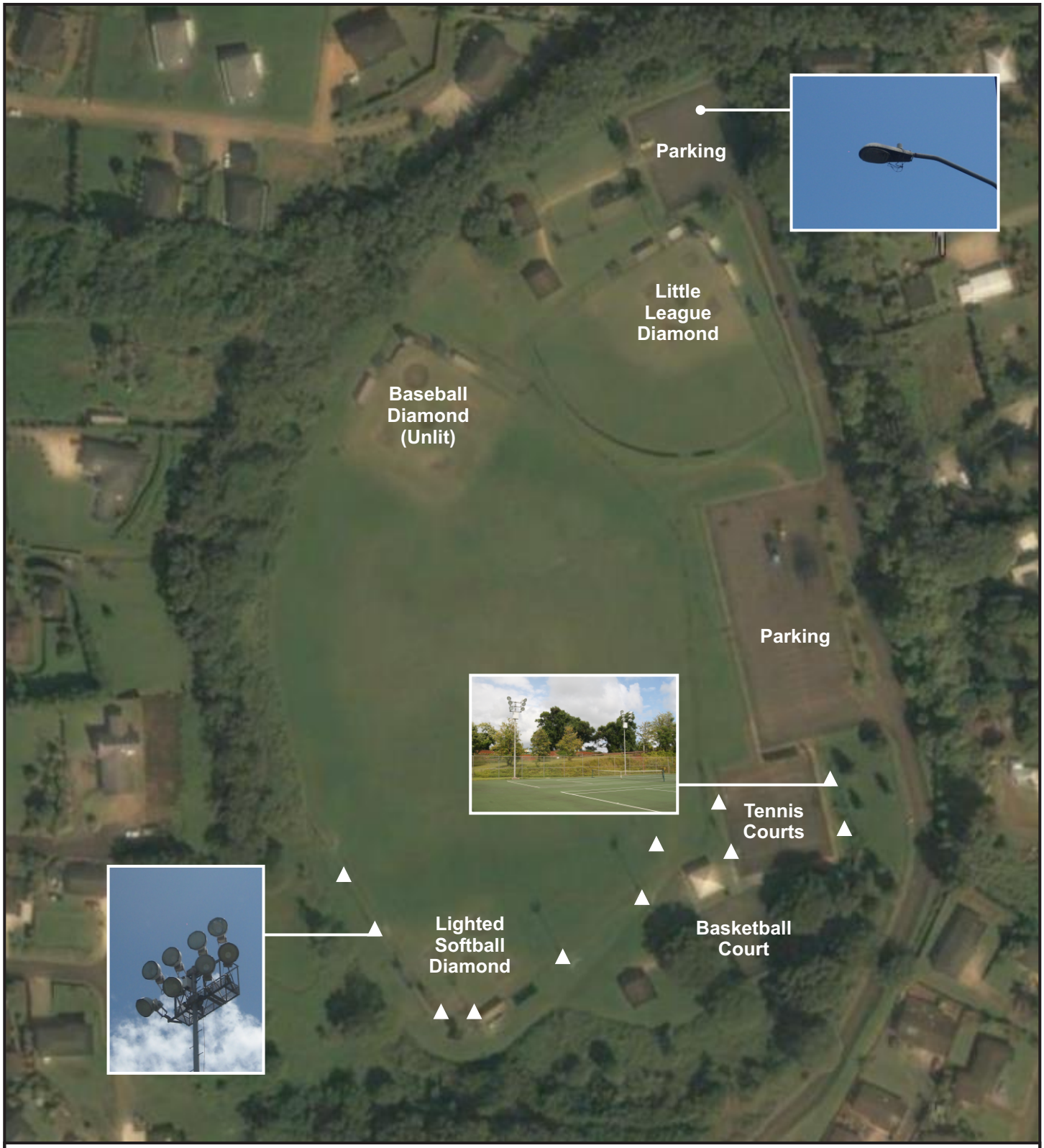


Facility Name:	TMK Parcel No.:	Lighting Information:
Isenberg Park	3-8-15:24	-Parking lot is lit with 5 unshielded streetlights. -Basketball court is illuminated by 4 poles supporting 2 floodlights each. -Baseball diamond and soccer field are lit by 8 poles with 4 to 6 floodlights each. All are unshielded. -The rec. center and gymnasium are lit with exterior fluorescent lights.
Facility Type:	**Facility Lighting:**	
Neighborhood Park (Type III)	Yes	
Size:	**Lighting Controls:**	
9.16 Ac.	-Softball field is manual by permit. -Basketball court is manual. -Parking lot is automatic.	

Isenberg Park 2016-08-02.cdr

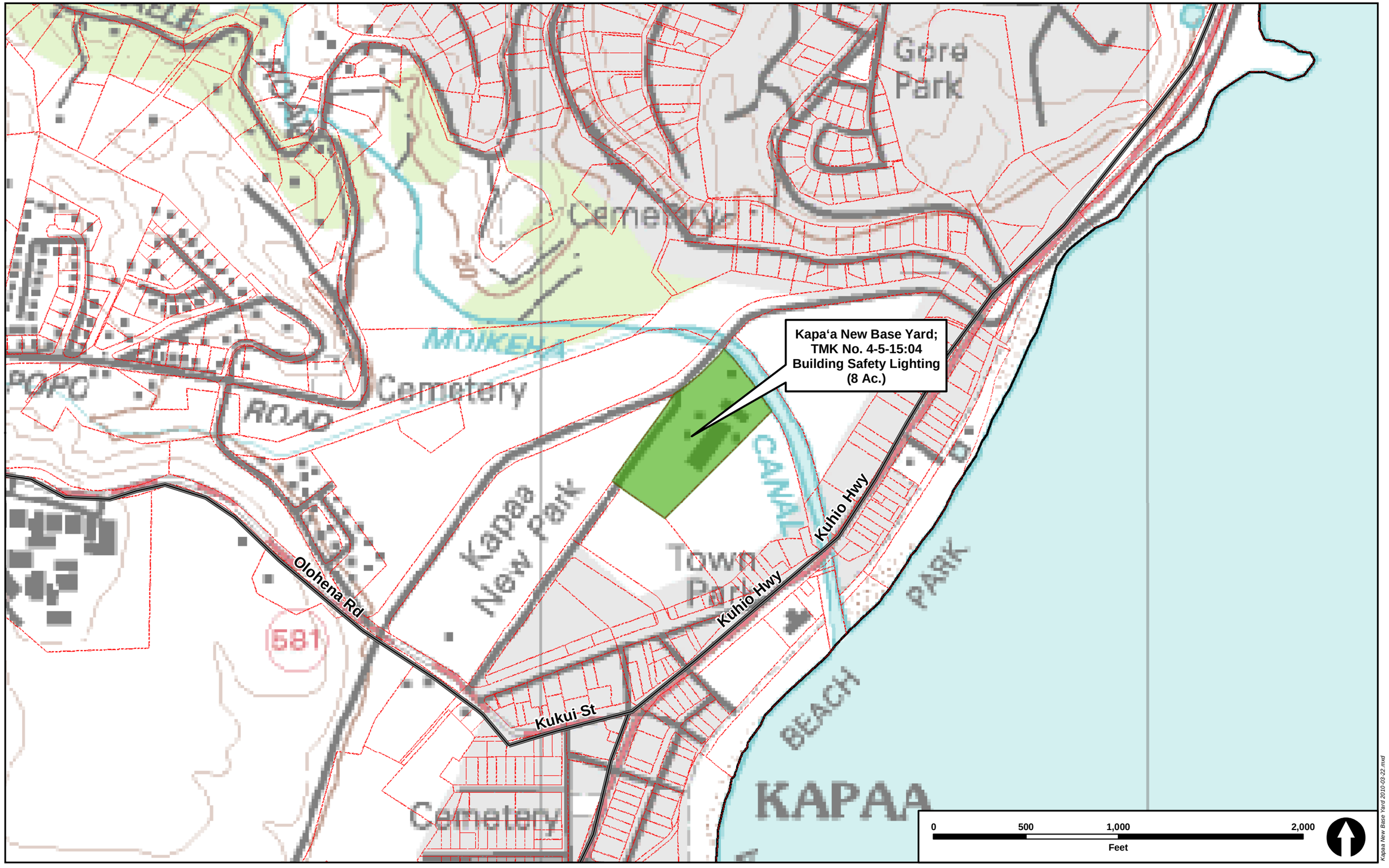

Kalaheo Park (2.679 Ac.); baseball/softball diamond, no exterior lighting, shelter.
Hokua Rd
Maka Rd
Puu Rd
Polaris Rd
Puu Kulana Pl
Park
0
125
250
500
Feet
Kalaheo Park 2010-06-25.mxd


Kalawai Park; Comfort Station, Little Leage and Baseball Fields, Lighted Softball Field, Tennis and Basketball Courts, Playground Equipment, Foodbooth, Pavilion (21.04 Ac.)
Lae Rd
Ohana Aina Pl
Wawae Rd
Iwi Rd
Puuwai Rd
Kalawai Park
750
0
125
250
500
Feet
Kalawai Park 2008-07-23.mxd



Facility Name:	TMK Parcel No.:	Lighting Information:
Kalawai Park	2-4-05:13	-Softball field is lit by 6 poles with 6-8 floodlights each.
Facility Type: District Park (Type II)	**Facility Lighting:** Yes	-Tennis court has 4 poles with 6 floodlights each.
Size: 21.04 Ac.	**Lighting Controls:** -Programmed online -Tennis on demand - Softball by permit.	-Bathrooms and 2 storerooms are lit by interior and exterior fluorescent lights.
		-Basketball court and playground equipment are unlit.
		-Access road has truncated streetlights.

Kalawai Park 2016-08-02.cdr



Kapaa New Base Yard 2010-03-22.mxd

Facility Name:

Kapa'a New Base Yard

Facility Type:

Base Yard

Size:

8 Ac.

TMK Parcel No.:

4-5-15:04

Facility Lighting:

Yes

Lighting Controls:

6:00PM-6:00AM

Lighting Information:

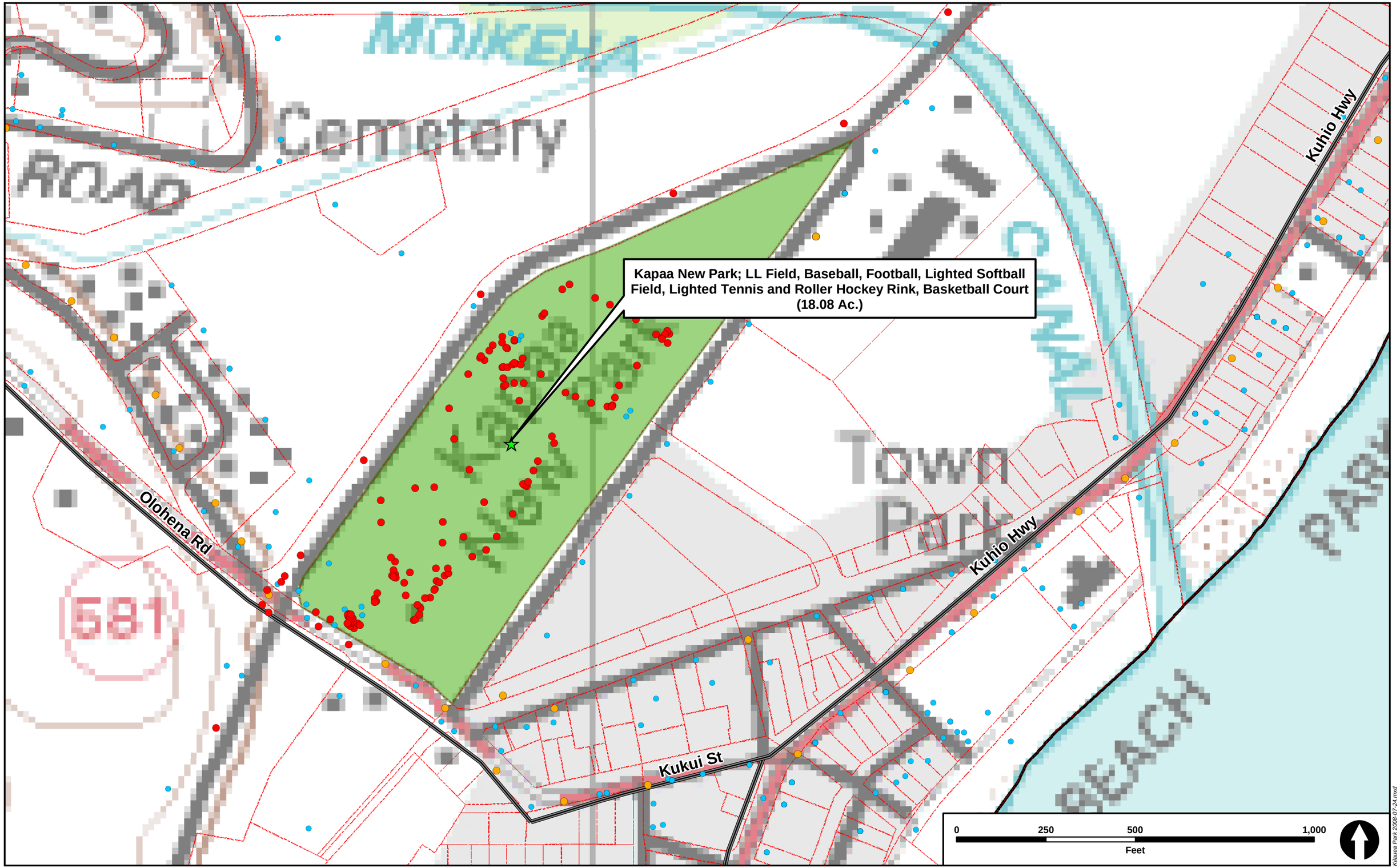
-26 x 9 watt Compact Fluorescent Lights

-3 x 27 watt Compact Fluorescent Lights

-4 x 150 watt High Pressure Sodium Lights

-Lights are in use all week, from dusk until dawn.

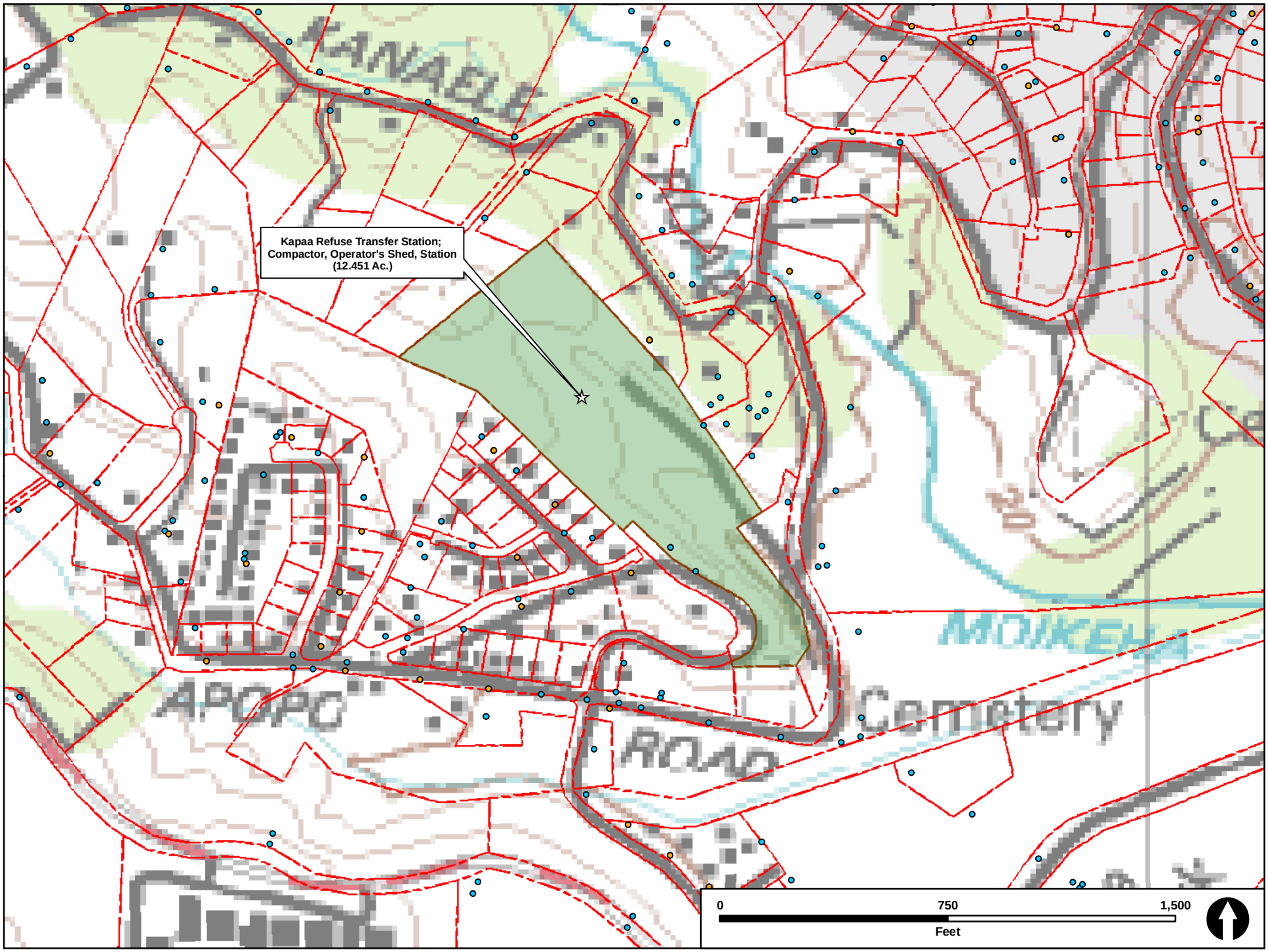
Kapaa New Base Yard 2010-03-25.cdr



Kilauea Park 2008-07-24.mxd

Facility Name:	TMK Parcel No.:	Lighting Information:
Kapaa (New) Park	4-5-15:32	-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.
Facility Type: District Park (Type II)	**Facility Lighting:** Yes	
Size: 18.08 Ac.	**Lighting Controls:** Basketball and tennis courts programmed online; others are manual.	

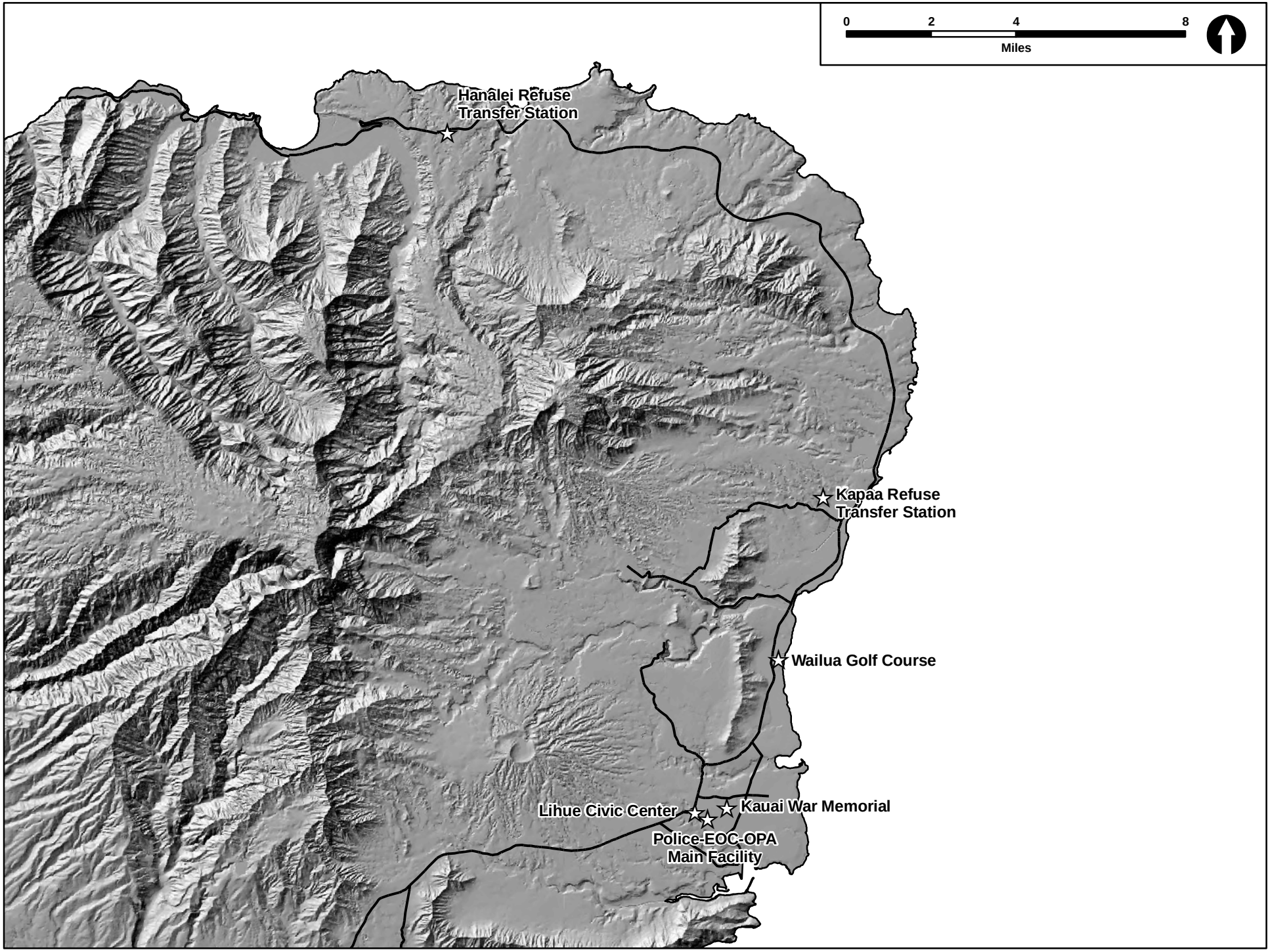
Kapaa New Park 2016-08-02.cdr



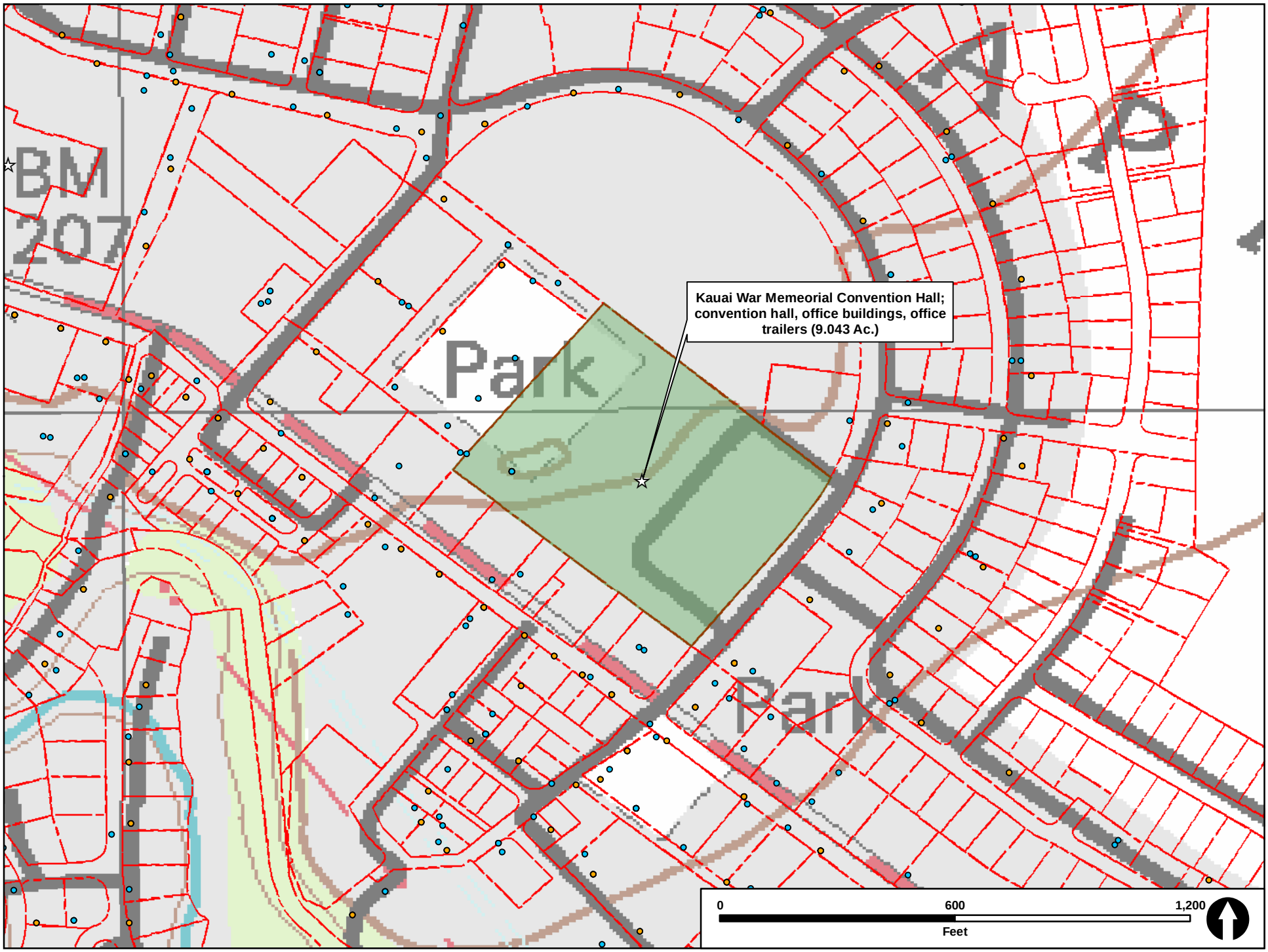
Kapaa Refuse Transfer Station 2009-08-31.mxd

Facility Name:	TMK Parcel No.:	Lighting Information:
Kapaa Refuse Transfer Station	4-6-12:4	-Compactor, Operator's Shed and Comfort Station are all lit.
Facility Type:	**Facility Lighting:**	
Transfer Station	Yes	
Size:	**Lighting Controls:**	
12.451 Ac.	Unknown	

Kapaa Refuse Transfer Station 2009-08-31.cdr



Kauai County Other Lighted Facilities 2009-03-12.mxd


Kauai War Memeorial Convention Hall; convention hall, office buildings, office trailers (9.043 Ac.)
BM
207
Park
Park
0
600
1,200
Feet
Kauai War Memorial Convention Hall 2009-08-31.mxd

Facility Name:
Kauai War Memorial Convention Hall

Facility Type:
Convention Hall & Office Building

Size:
9.043 Ac.

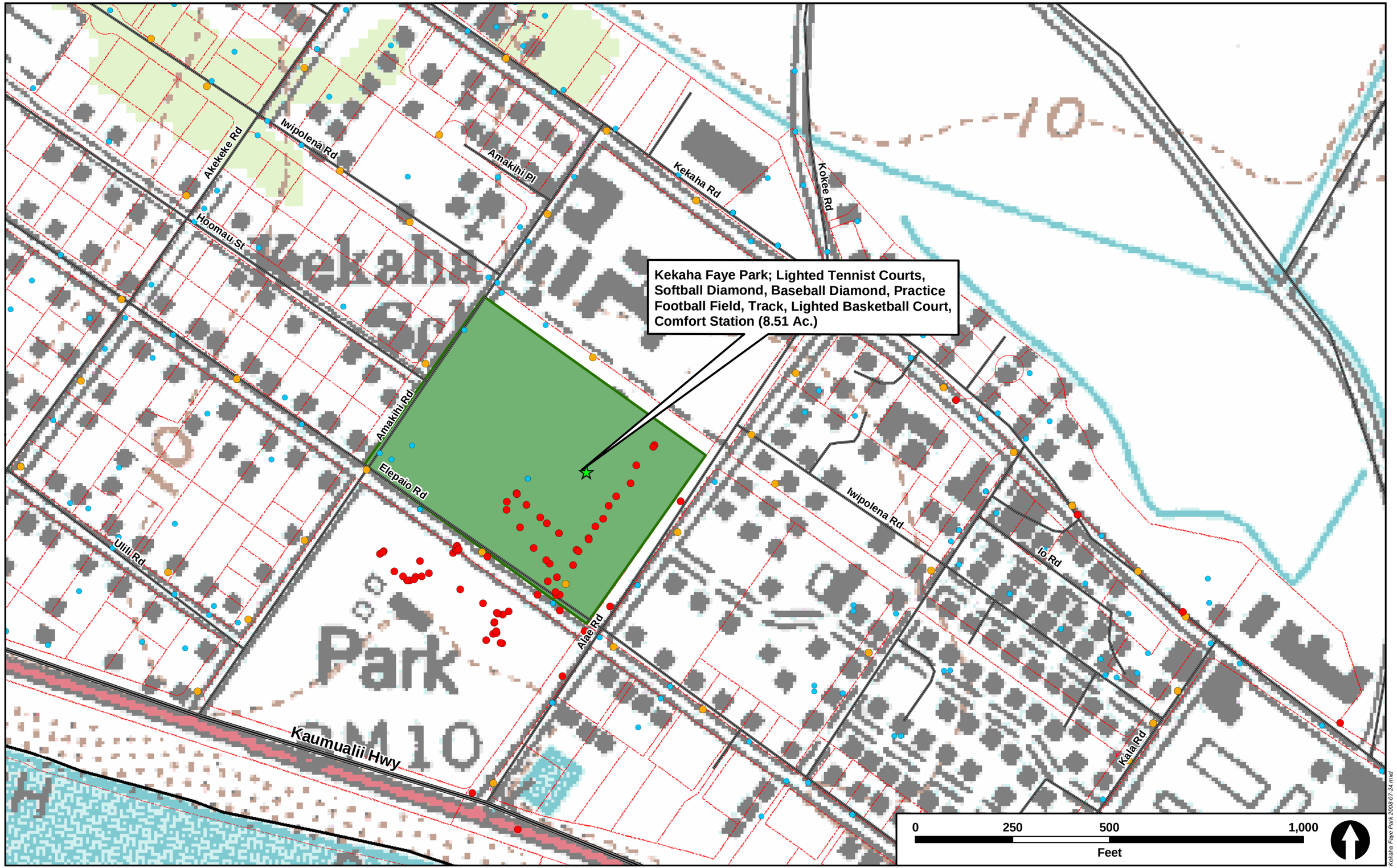
TMK Parcel No.:
3-6-2:9

Facility Lighting:
Yes

Lighting Controls:
Unknown

Lighting Information:
-Convention hall, office buildings, office trailers and parking all have area lighting.

Kauai War Memorial Convention Hall 2009-08-31.cdr



Kekaha Faye Park 2008-07-24.mxd

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 Controls:

-Softball programmed online by permit.
-Basketball and tennis on demand.

Lighting Information:

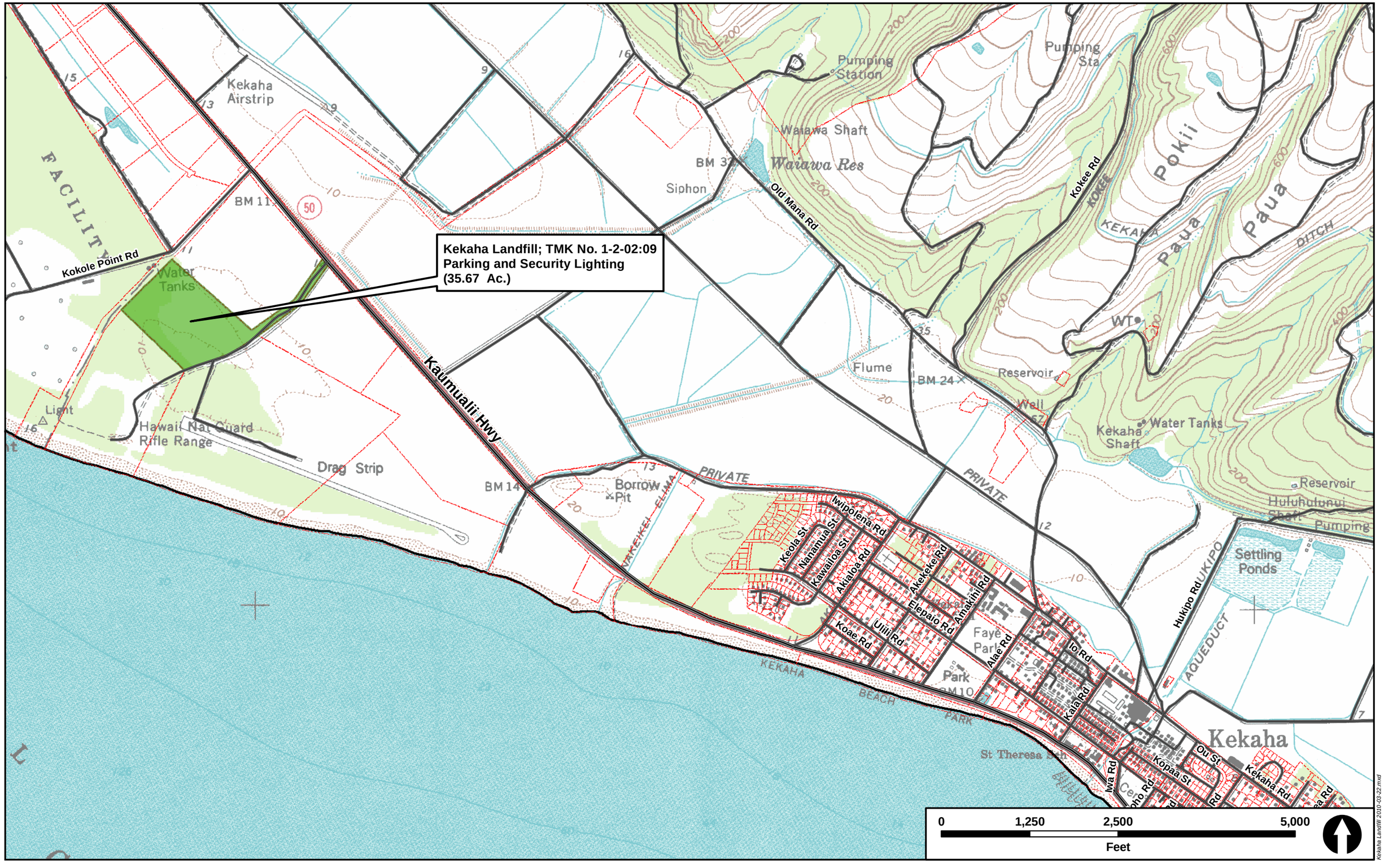
-6 poles with 8-10 floodlights each illuminate the baseball diamond and are manually controlled.

-2 streetlight type poles illuminate an auxiliary parking area.

-Comfort station lit with strip fluorescent lights.

-Basketball court and football practice field are unlit.

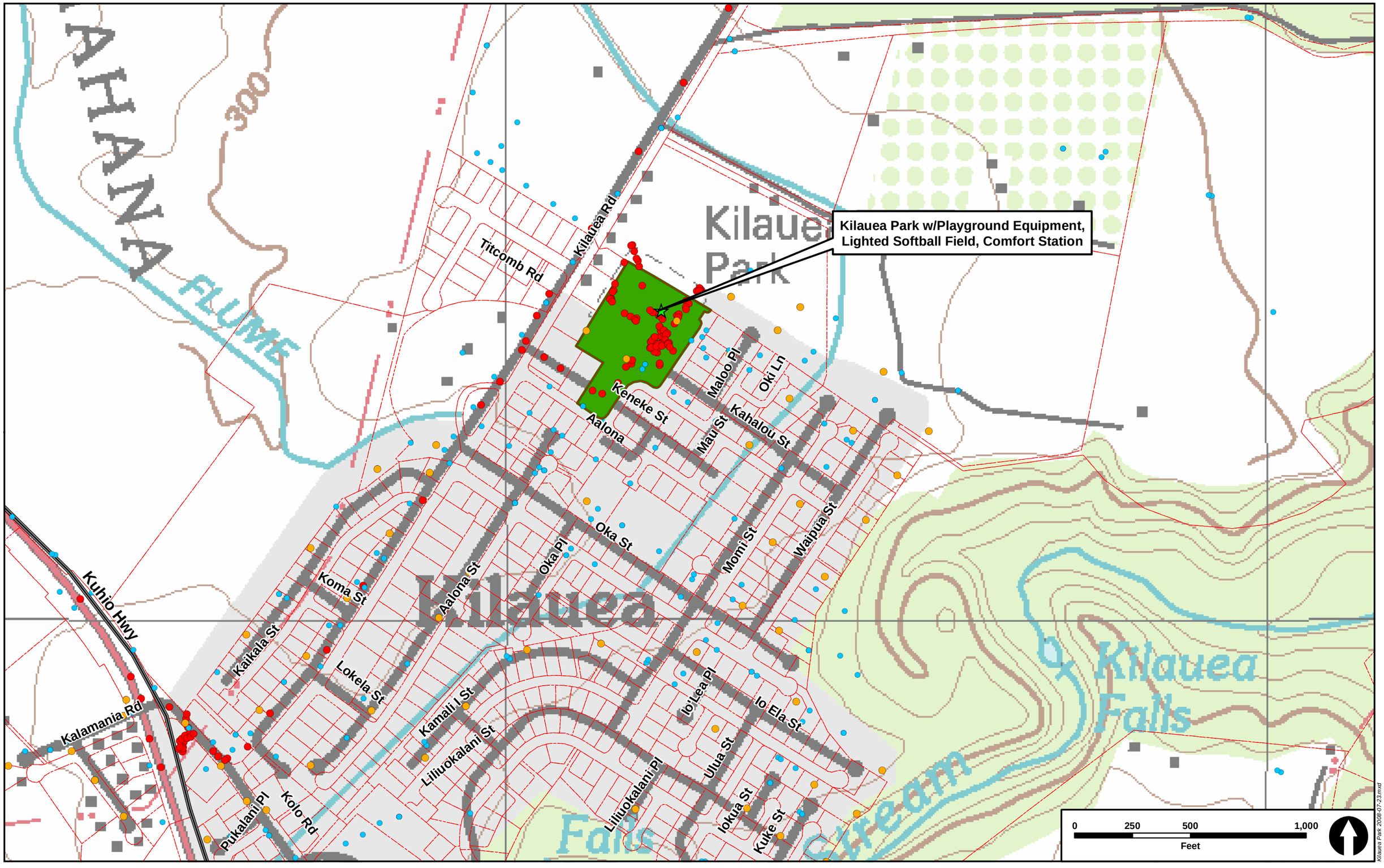
Kekaha Faye Park 2016-08-02.cdr



Kekaha Landfill 2010-03-22.mxd

Facility Name:	TMK Parcel No.:	Lighting Information:
Kekaha Landfill	1-2-02:09	-9 x 400 watt Sodium Parking Lights
Facility Type:	**Facility Lighting:**	-5 x 50 watt Recessed Sodium Building Lights
Sanitation	Yes	-5 x 75 watt Incandescent Lights
Size:	**Lighting Controls:**	-3 x High Pressure Sodium Lights
35.67 Ac.	Unknown	-Lights are in use all week, from dusk until dawn.

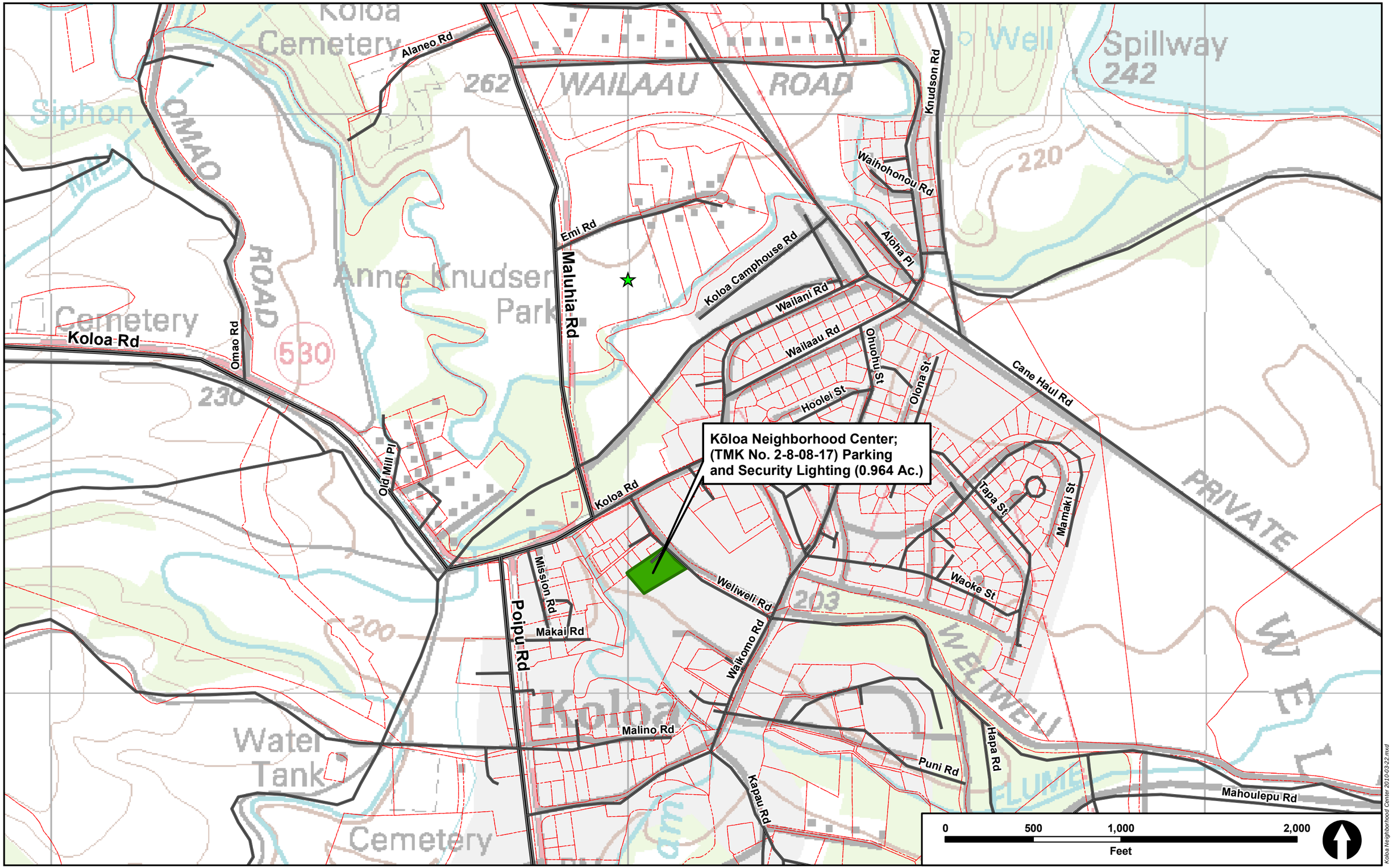
Kekaha Landfill 2010-03-25.cdr



Kilauea Park 2008-07-23.mxd

Facility Name:	TMK Parcel No.:	Lighting Information:
Kilauea Park	5-2-08:54	-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.
Facility Type:	**Facility Lighting:**	
District Park (Type II)	Yes	
Size:	**Lighting Controls:**	
4.93 Ac.	Manual by permit.	

Kilauea Park 2016-08-02.cdr



Koloa Neighborhood Center 2010-03-22.mxd

Facility Name:

Kōloa Neighborhood Center

Facility Type:

Community Center

Size:

0.97 Ac.

TMK Parcel No.:

2-8-08:17

Facility Lighting:

Yes

Lighting Controls:

7:00PM-7:00AM

Lighting Information:

-5 x 150 watt High Pressure Sodium Lights

-16 x Fluorescent Exterior Security Lights

-6 x Exterior Wall Fixtures

-Lights are on all night.

Koloa Neighborhood Center 2010-03-29.cdr

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.

Lihue Auto Maintenance Garage & Office 2010-03-30.cdr

Lihu'e Auto Maintenance Gargage & Office;
TMK No. 3-8-05:17
Security Lighting (1.541 Ac.)
Cemetery
Nawiliwili
Park
Pua Loke
Kuhio
Hoomana Rd
Kaumualii Hwy
Nawiliwili Rd
Wehe Rd
Haleko Rd
Kukui Grove St
Halehaka Rd
unnamed road
Poinciana St
Kuhio Hwy
Kali Rd
Hardy St
Ewa St
Ewalu St
Waa Rd
Kele St
Malae St
Kaana St
Lalei Pl
Palai St
Alohi St
Uluhui St
Umi St
Eliu St
Akahi St
Fujii St
Inouye St
Jerves St
Kupu Ln
Kokio St
Iliahi St
Mohala St
Pua Loke St
Kiele Ln
Pua Nani St
Kress St
Rice St
Kalena St
Malama St
Hoala St
Umahe St
Puaole St
Hoene St
Pualiki St
Pikake St
Aukoi St
Aheahe Pl
Aheahe St
Hili St
Huna St
Kepa St
Hili Pl
Palau Manu St
Kanani St
Opuu Ln
Paia St
Kapena Pl
Hoolako St
Hoolako Pl
Onionii St
223
200
50
0
1,250
2,500
Feet
Lihue Auto Maintenance Garage 2010-03-22.mxd

Facility Name:
Līhuʻe Civic Center

Facility Type:
Office Buildings

Size:
1.5369 Ac.

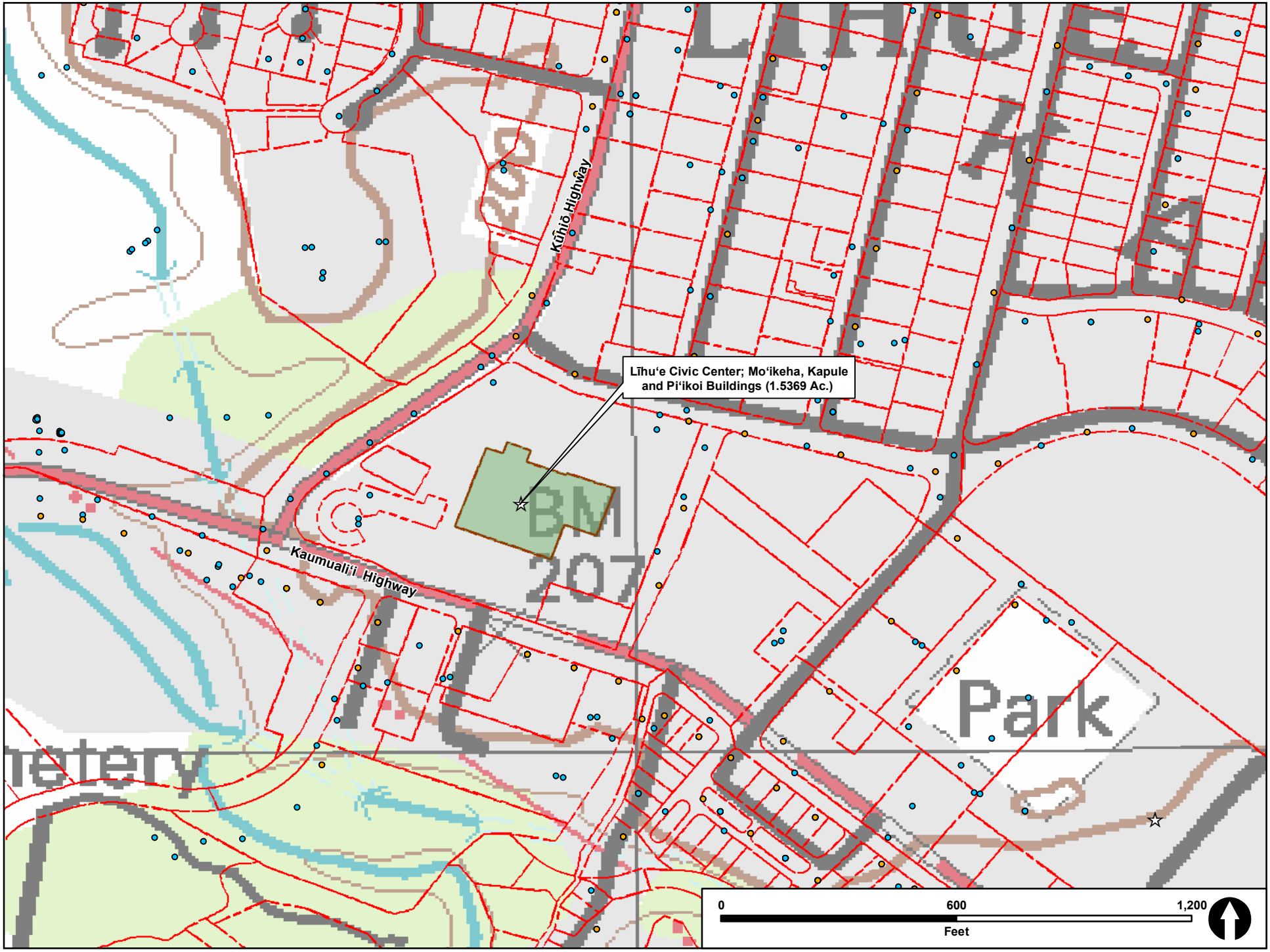
TMK Parcel No.:
3-6-5:27

Facility Lighting:
Yes

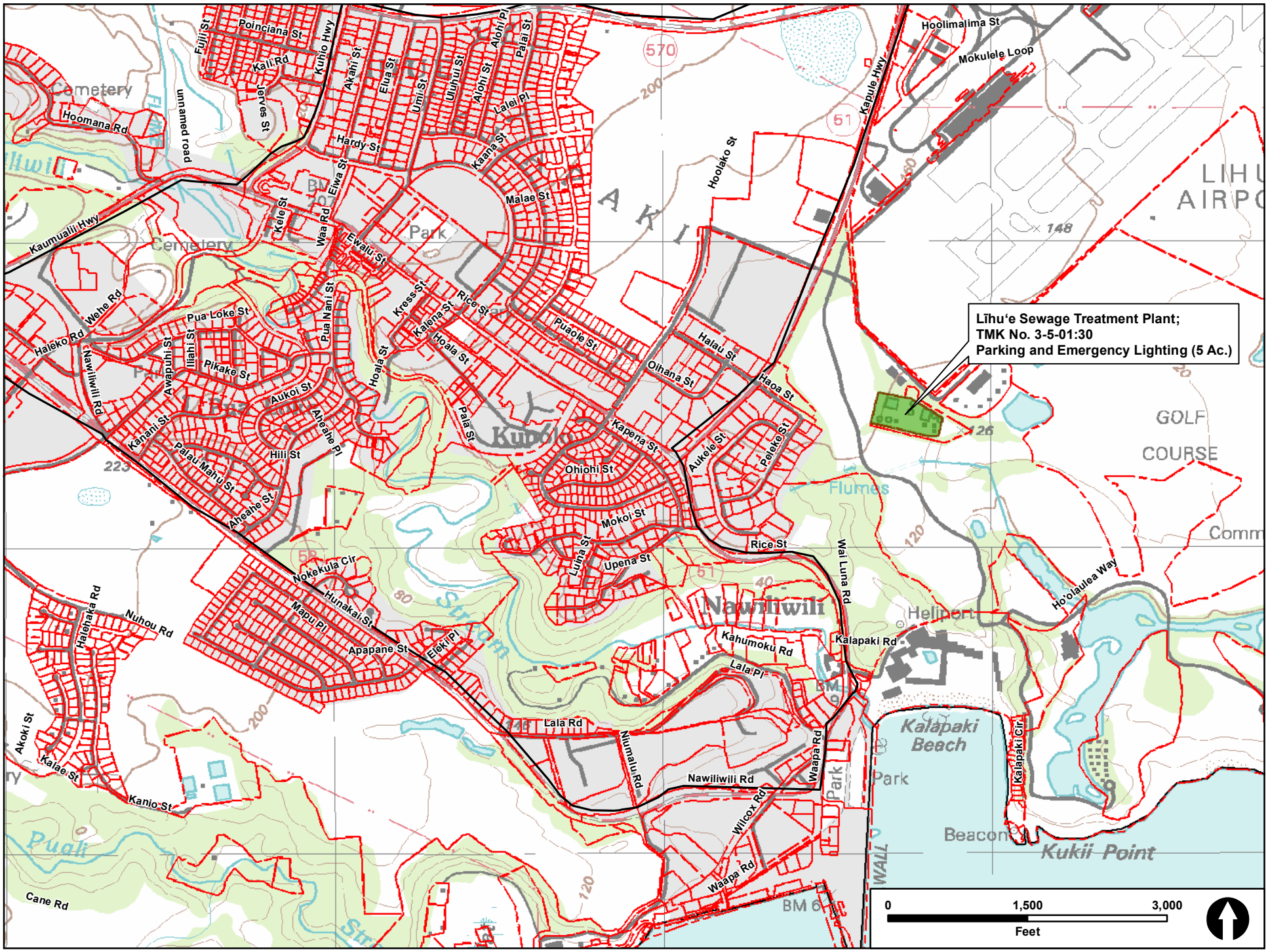
Lighting Controls:
Unknown

Lighting Information:
-Moʻikeha, Kapule and Piʻikoi Buildings all have area and parking lighting.

Lihue Civic Center 2009-08-31.cdr



Lihue Civic Center 2009-09-01.mxd



0 1,500 3,000
Feet

Lihue Sewage Treatment Plant 2010-03-22.mxd

Facility Name:

Līhu'e Sewage Treatment Plant

Facility Type:

Sanitation

Size:

5 Ac.

TMK Parcel No.:

3-5-01:30

Facility Lighting:

Yes

Lighting Controls:

Unknown

Lighting Information:

-19 x Sodium Parking Lights

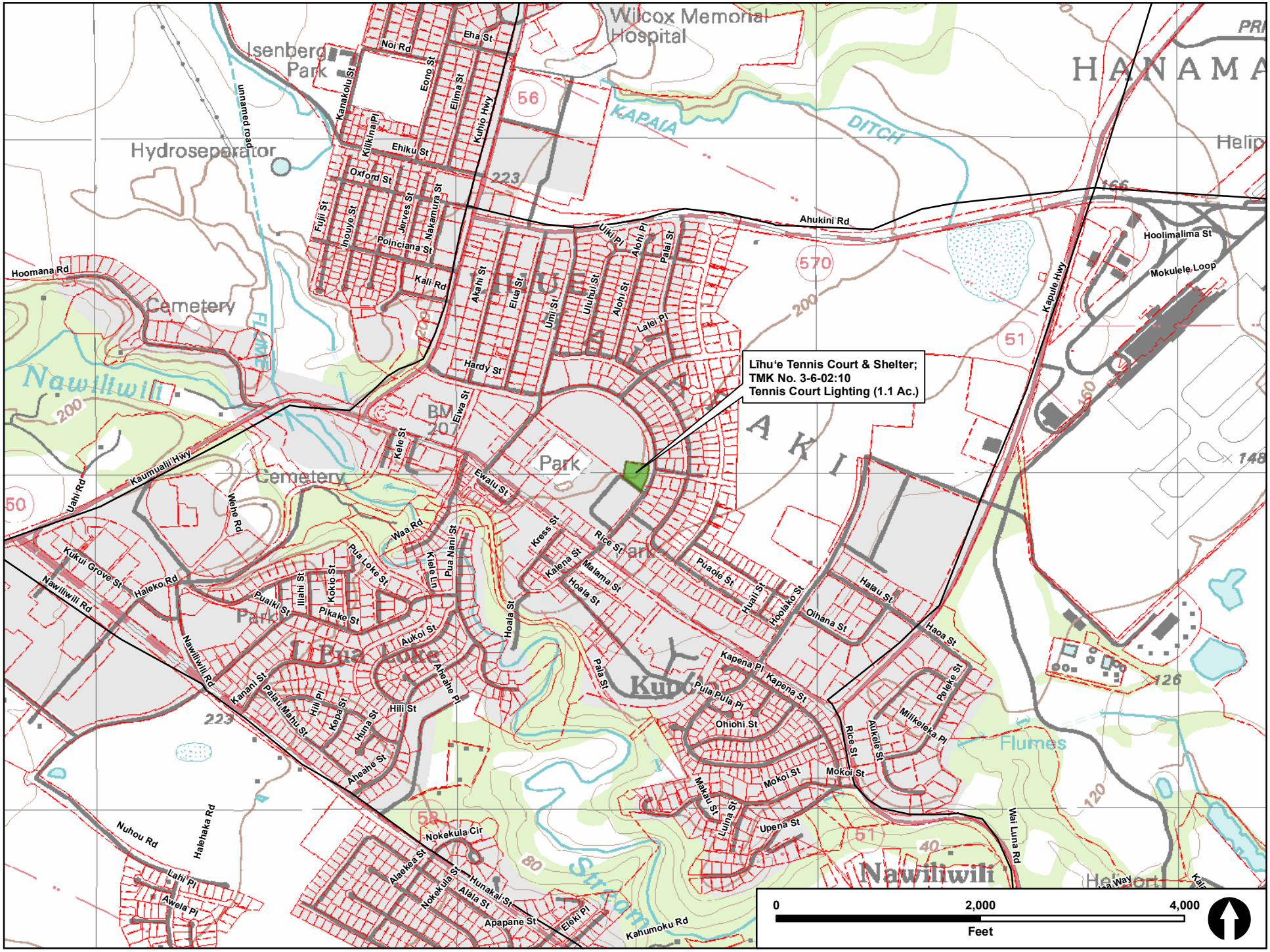
-9 x Sodium Flood Lights

-14 x Fluorescent Lights

-17 x Incandescent Lighs

-Lights are used only as needed.

Līhue Sewage Treatment Plant 2010-03-30.cdr



Lihue Tennis Court & Shelter 2010-03-23.mxd

Facility Name:

Līhu'e Tennis Courts & Shelter

Facility Type:

Neighborhood Park (Type IV)

Size:

1.1 Ac.

TMK Parcel No.:

3-6-02:10

Facility Lighting:

Yes

Lighting Controls:

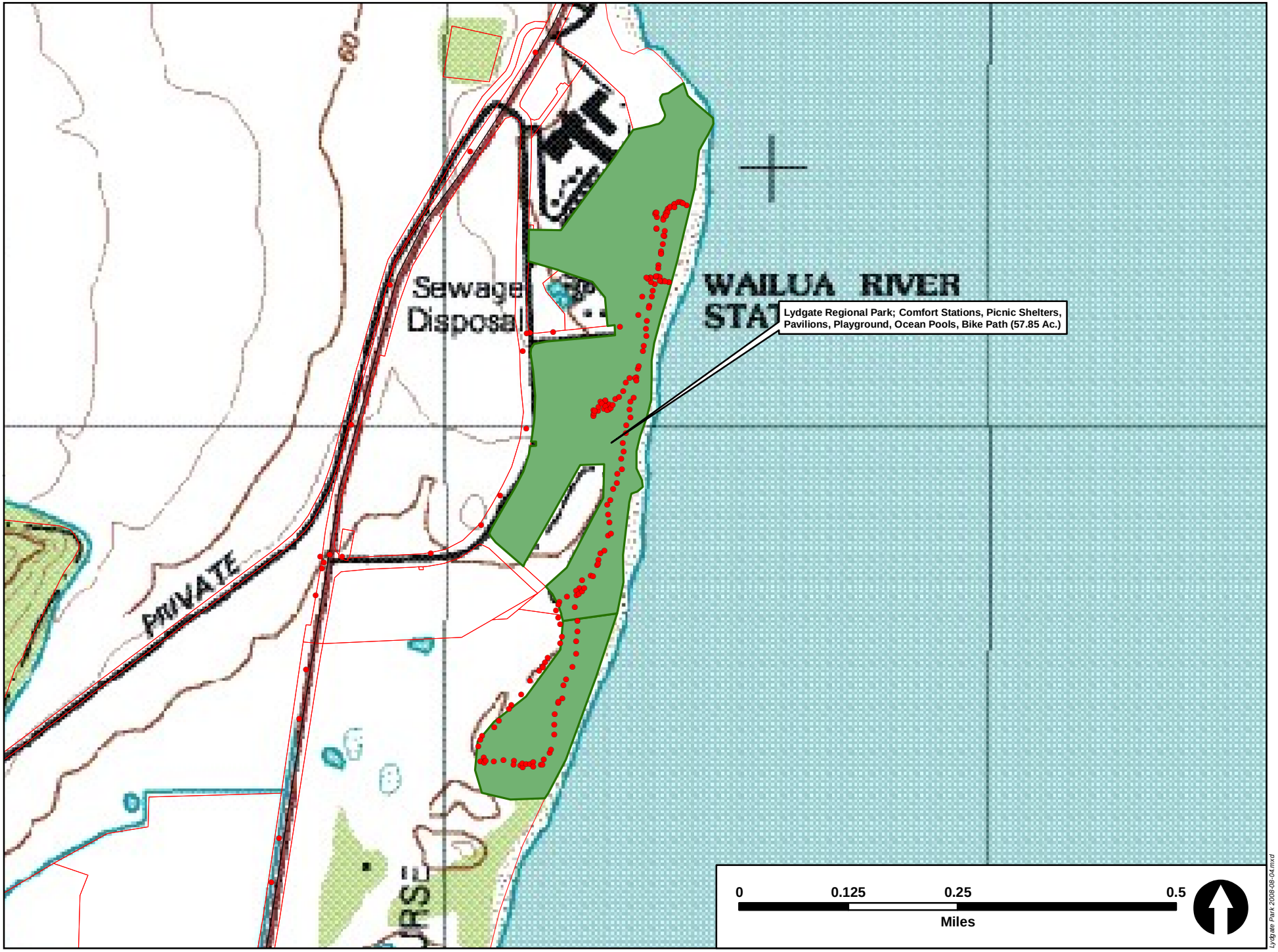
Programmed online.

Lighting Information:

-12 x 1,000 watt Court Lights

-Lights are on daily until 10:00 PM, and until 8:00 PM during fallout season.

Lihue Tennis Court & Shelter 2016-08-02.cdr


Sewage
Disposal
WAILUA RIVER
STAT
Lydgate Regional Park; Comfort Stations, Picnic Shelters, Pavilions, Playground, Ocean Pools, Bike Path (57.85 Ac.)
PRIVATE
0
0.125
0.25
0.5
Miles
Lydgate Park 2008-08-04.mxd

Facility Name:	TMK Parcel No.:	Lighting Information:
Lydgate Park	3-9-60:01	-Lydgate park consists of a complex of comfort stations, picnic shelters, pavilions, and ocean pools connected by bike/jogging paths.
Facility Type:	**Facility Lighting:**	
Regional Park (Type I)	Yes	
Size:	**Lighting Controls:**	
57.85 Ac.	Staff Operated	

Lydgate Park 2008-08-04.cdr

Peter Rayno Lihue Park 2008-07-24.mxd

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 Controls:

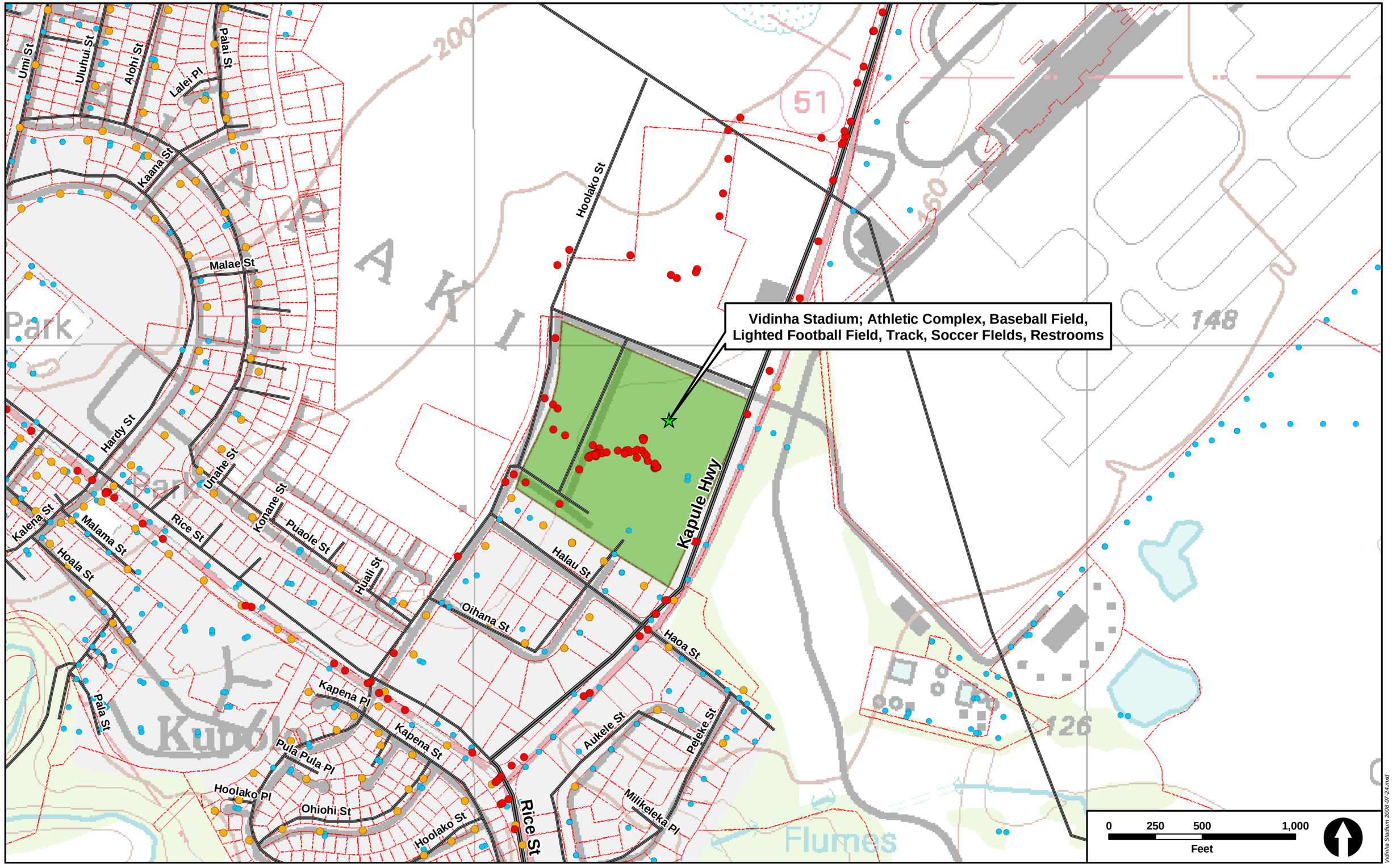
Manually operated by staff.

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.

Peter Rayno Hanamaulu Park 2016-08-02.cdr



Vidinha Stadium 2008-07-24.mxd

Facility Name:

Vidinha Stadium

Facility Type:

Stadium & District Park (Type I)

Size:

34 Acres

TMK Parcel No.:

3-6-02:16 & 3-6-02:19

Facility Lighting:

Yes

Lighting Controls:

-Stadium and baseball field controlled by staff.
-Parking lighting is automatic.

Lighting Information:

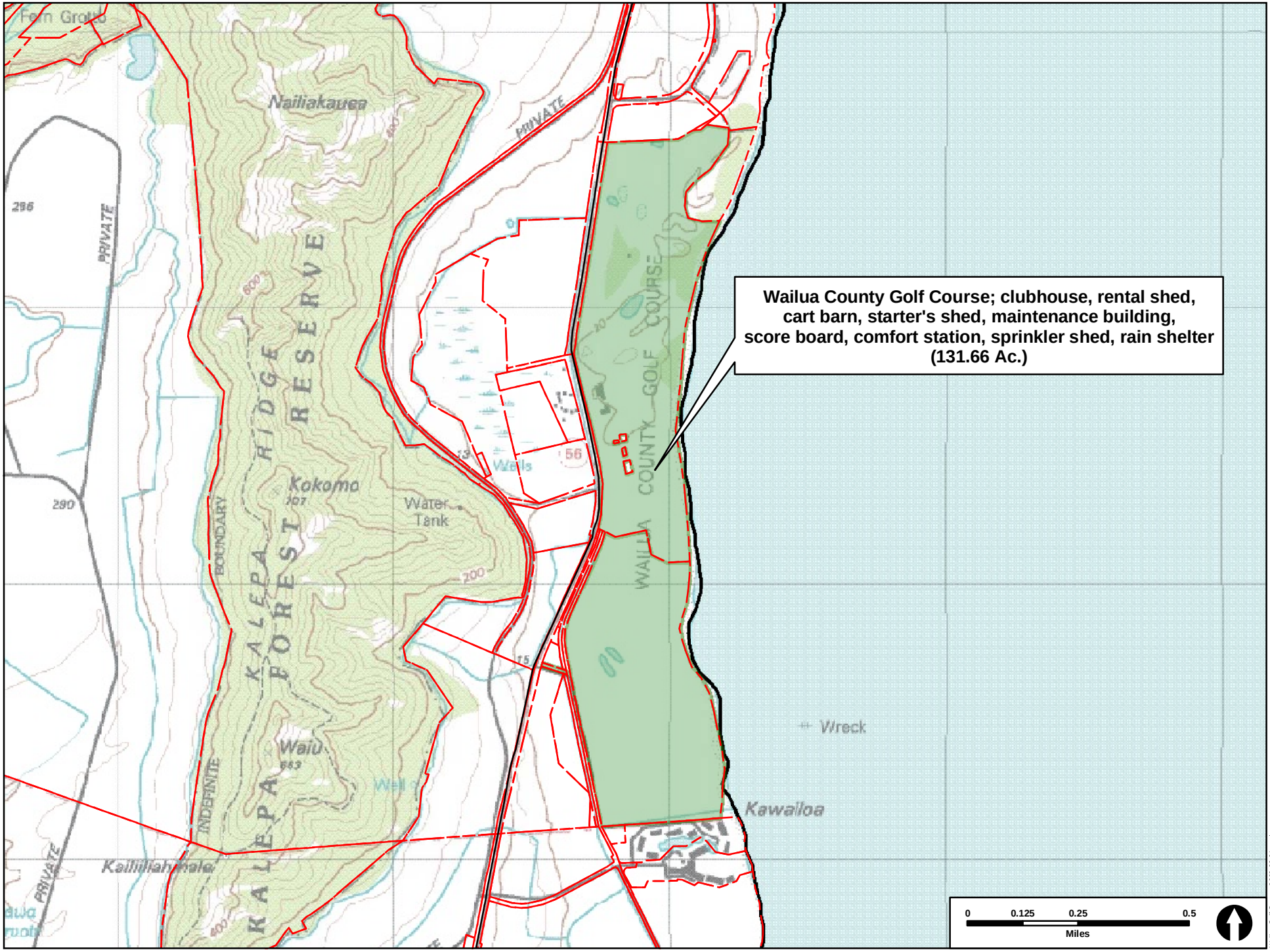
-Parking area has 23 poles with streetlight-type lighting, with 1-2 lights per pole.

-Stadium has six large poles with 18 floodlights each.

-Entrance lighting consists of 6 lights contained within a tinted plexiglass lampshade.

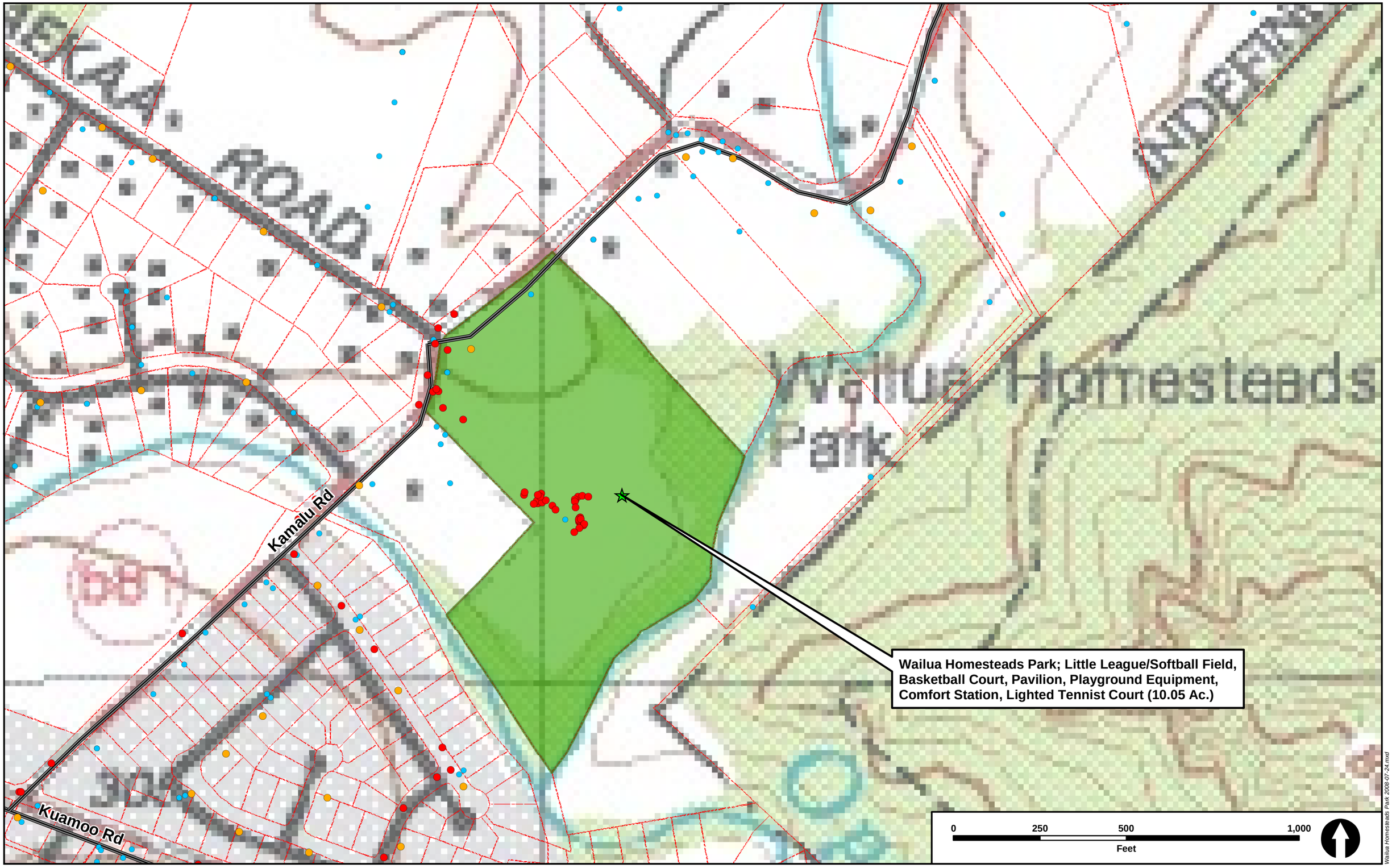
-The stadium building is lit with external and internal fluorescent lights, seven per side.

Vidinha Stadium Facility Sheet 2016-08-02.cdr


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.)
Fern Grotto
Nailiakauea
PRIVATE
296
290
KALEPA RIDGE FOREST RESERVE
KALEPA FOREST
INDEFINITE BOUNDARY
Kokomo
Water Tank
Wells
56
WAILUA COUNTY GOLF COURSE
Waiu
Well
Kailiilahanala
Wreck
Kawailoa
0
0.125
0.25
0.5
Miles
Wailua Golf Course 2009-09-01.mxd

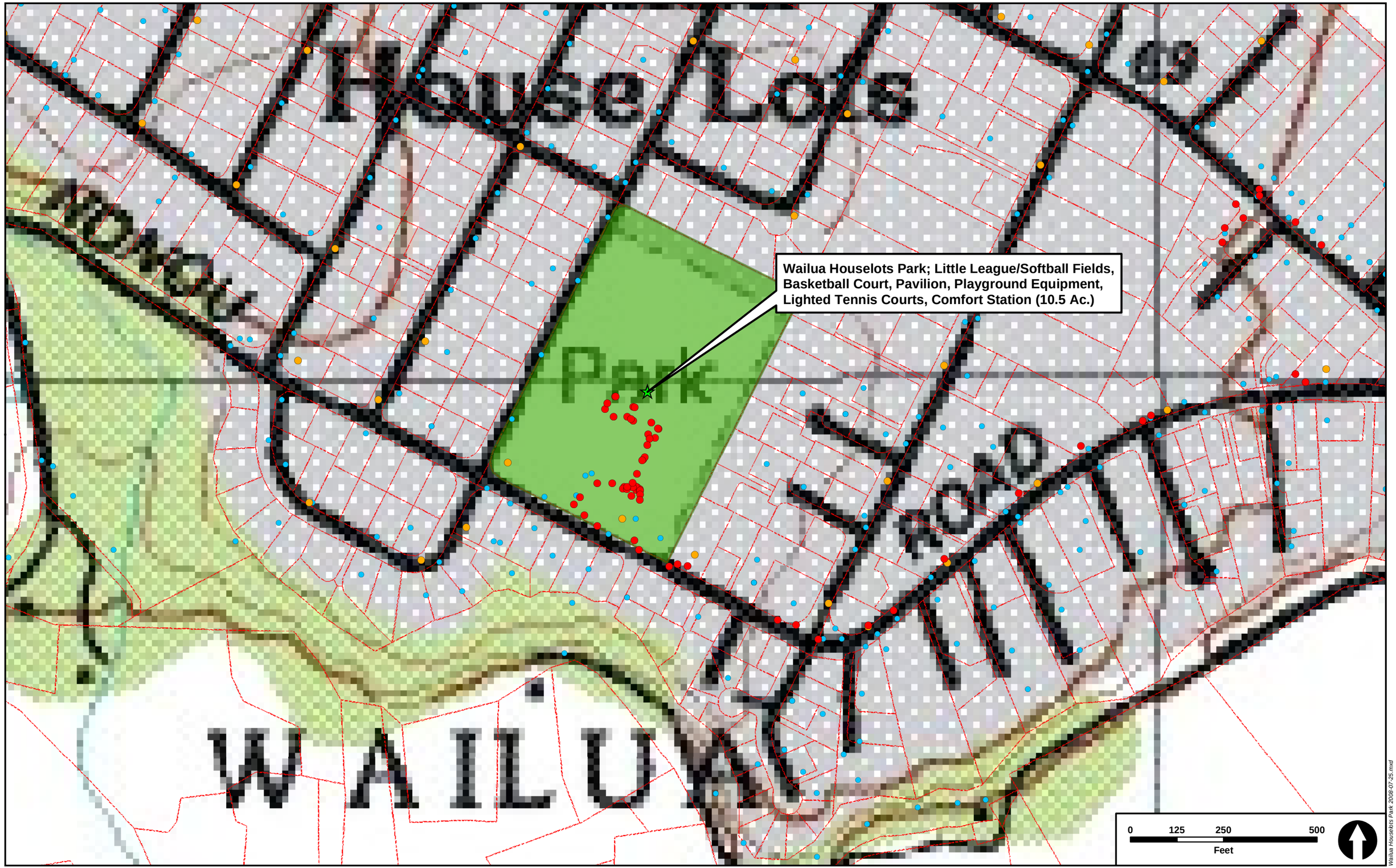
Facility Name:	TMK Parcel No.:	Lighting Information:
Wailua County Golf Course	3-9-2:4 & 3-9-5:1	-Lit facilities at Wailua County Golf Course include the clubhouse, rental shed, cart barn, starter's shed, maintenance building, score board.
Facility Type:	**Facility Lighting:**	
Golf Course	Yes	
Size:	**Lighting Controls:**	
131.66 Ac.	Staff Operated	

Wailua Golf Course 2016-08-05.cdr

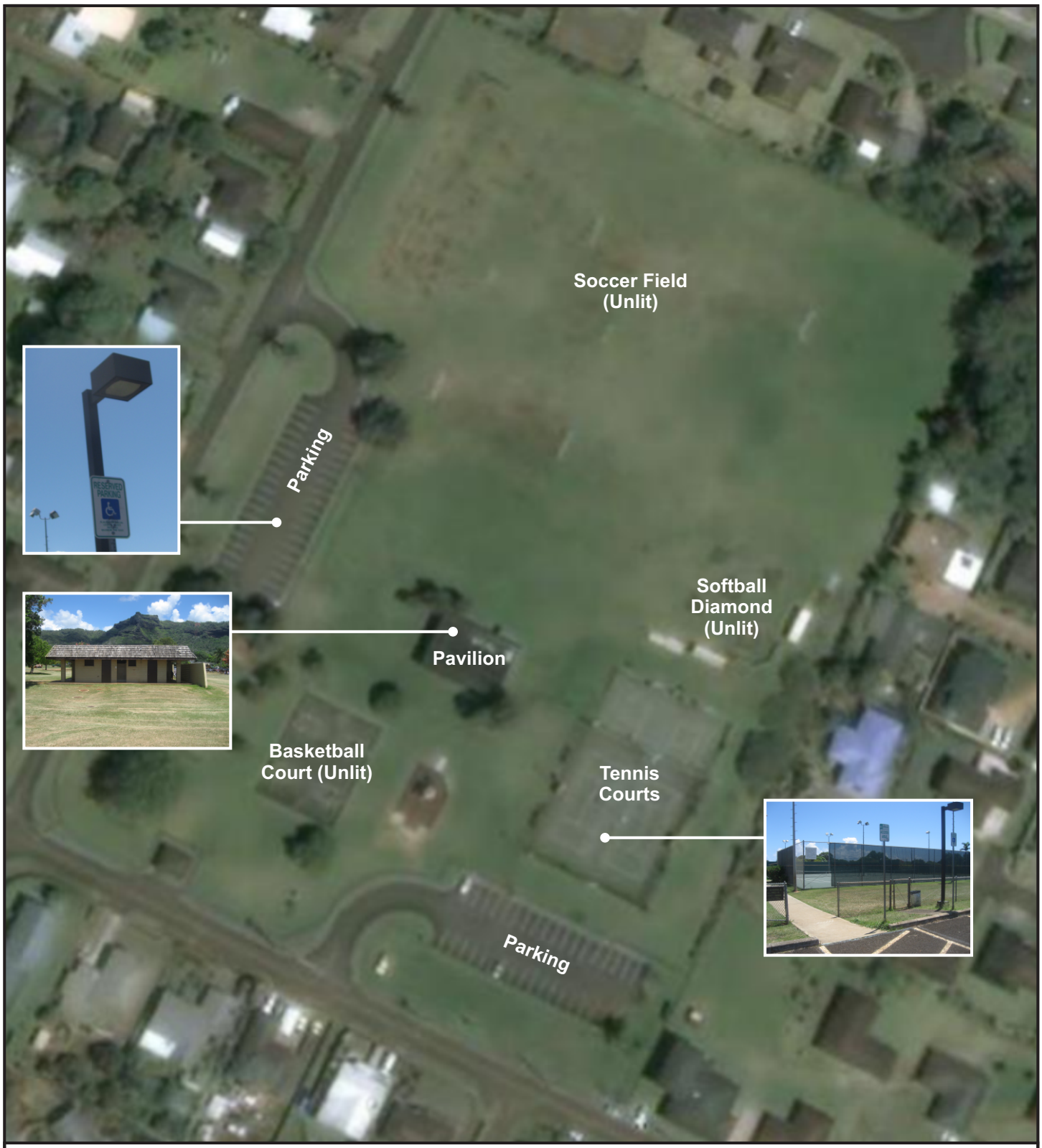

ROAD
Kamalu Rd
Kuamoo Rd
Wailua Homesteads
Park
Wailua Homesteads Park; Little League/Softball Field, Basketball Court, Pavilion, Playground Equipment, Comfort Station, Lighted Tennist Court (10.05 Ac.)
0
250
500
1,000
Feet
Wailua Homesteads Park 2008-07-24.mxd

Facility Name:	TMK Parcel No.:	Lighting Information:
Wailua Homesteads Park	4-2-03:18	-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.
Facility Type:	**Facility Lighting:**	
Neighborhood Park (Type III)	Yes	
Size:	**Lighting Controls:**	
16.63 Acres	Programmed Online and Manual	

Wailua Homesteads Park Facility Sheet 2016-08-02.cdr



Wailua Houselots Park 2008-07-25.mxd



Facility Name:

Wailua Houselots Park

Facility Type:

Neighborhood Park (Type III)

Size:

10.05 Acres

TMK Parcel No.:

4-1-16:42

Facility Lighting:

Yes

Lighting Controls:

-Pavilion is manual; tennis court is programmed online or turned on by user.
-Parking area has 10:00PM timed shut off.

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 Houselots Park Facility Sheet 2016-08-02.cdr

Wailea Sewage Treatment Plant 2010-03-23.mxd

Facility Name:

Wailua Sewage Treatment Plant

Facility Type:

Sanitation

Size:

2.03 Ac.

TMK Parcel No.:

3-9-06:19

Facility Lighting:

Yes

Lighting Controls:

Unknown

Lighting Information:

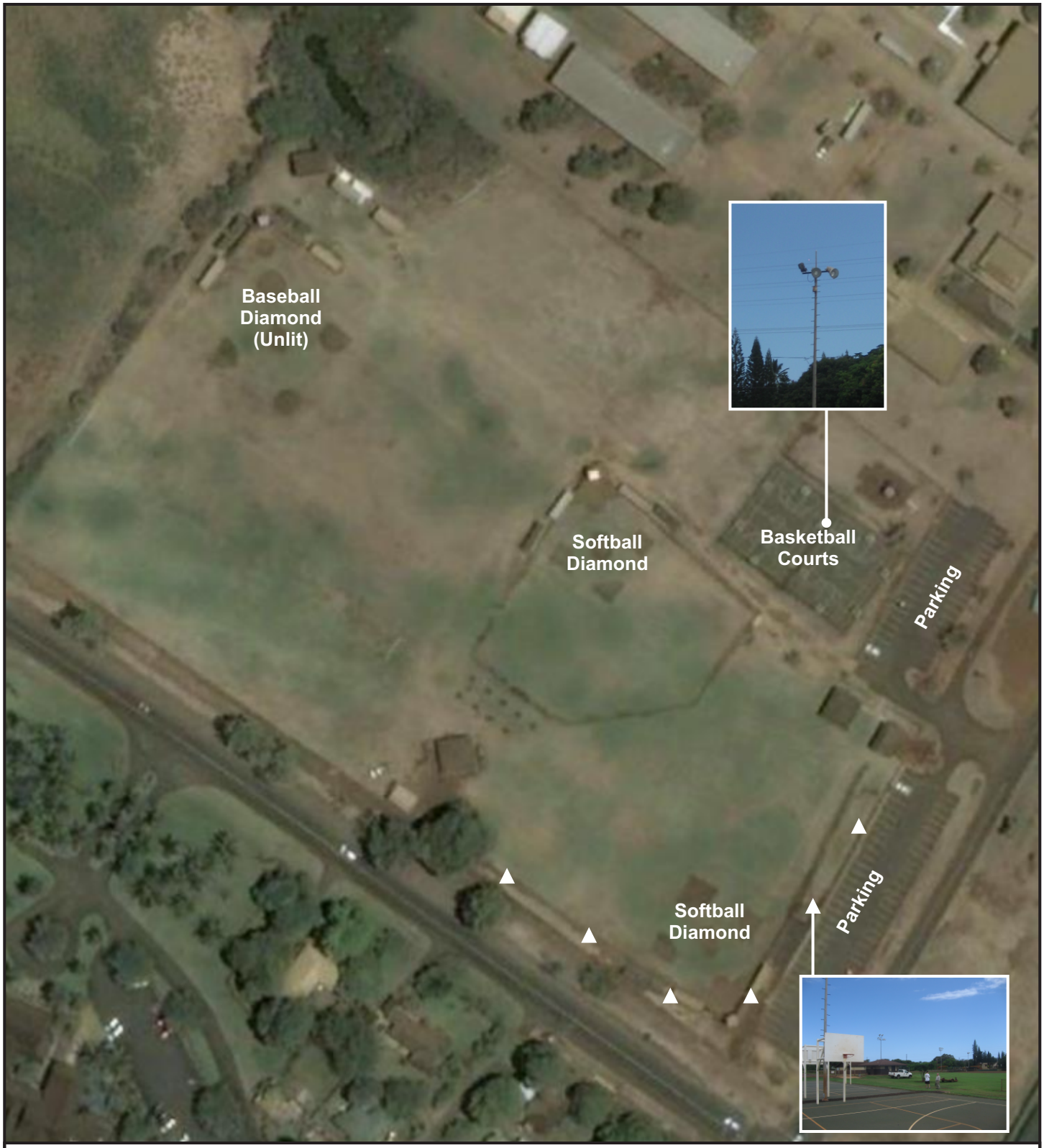
-12 x Sodium Parking Lights

-2 x Sodium Floodlights

-2 x Flourescent Building Lights

-Floodlights are on all night, all other lights are only used during emergencies or special events.

Wailua Sewage Treatment Plant 2010-03-25.cdr



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 Controls:

-Softball by permit.
-Basketball on demand.
-All others programmed online.

Lighting Information:

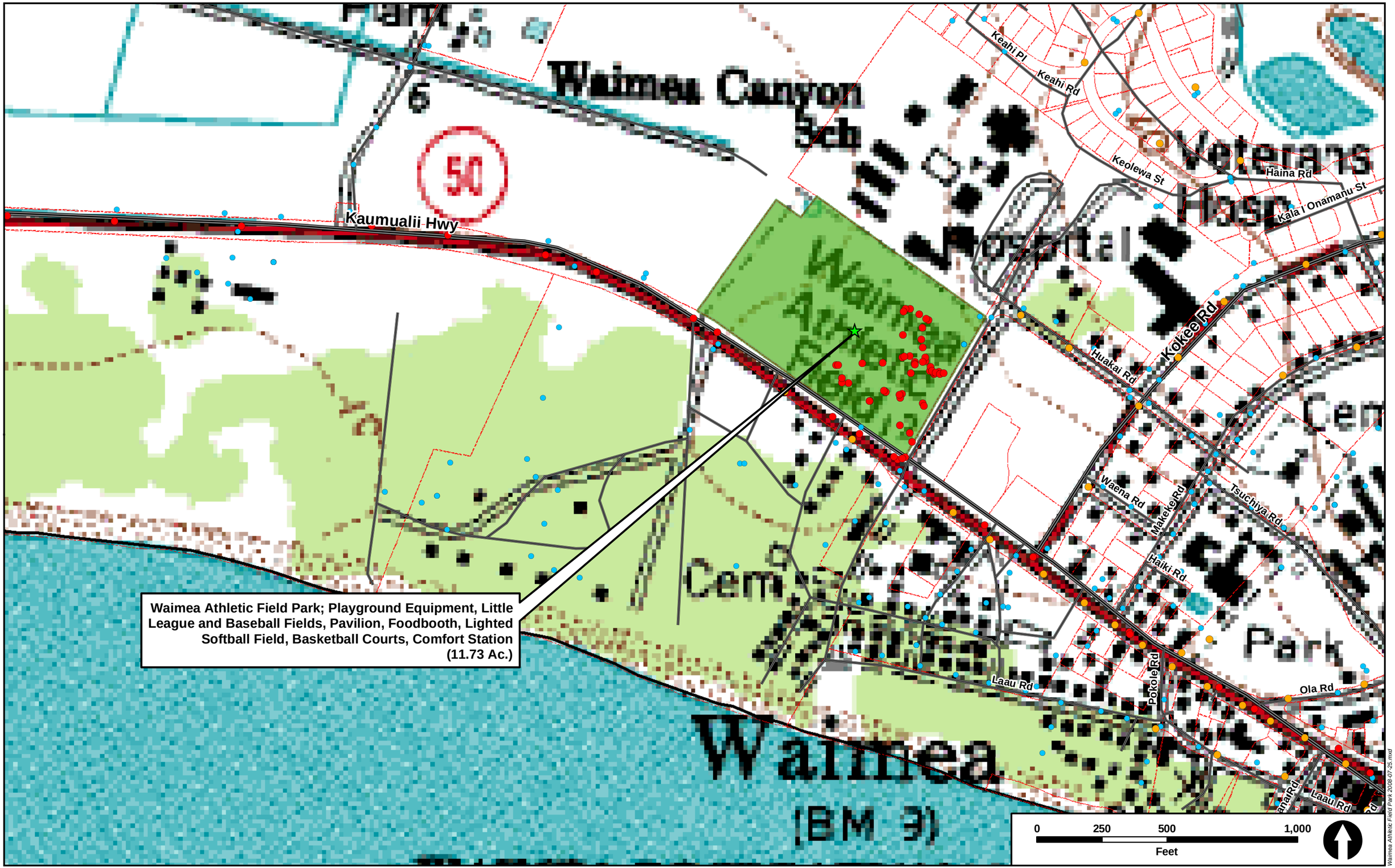
-Softball diamond is lit with 6 poles of 2-6 floodlights each.

-Basketball court is illuminated by 4 poles with 2 street-lights each.

-Comfort station and pavilion are lit with strip fluorescent lighting.

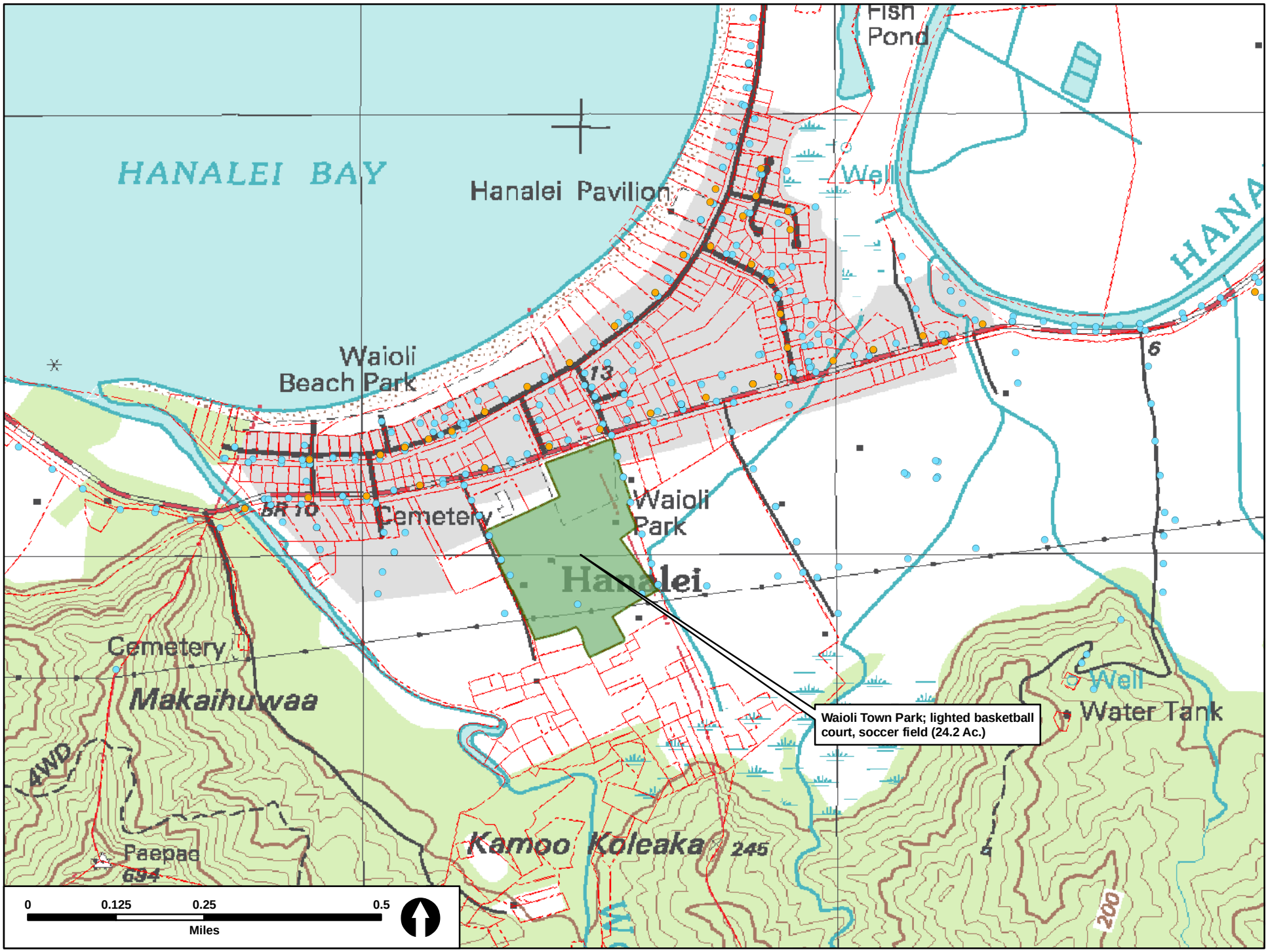
-Other facilities are unlit.

Waimea Athletic Field 2016-08-02.cdr



Waimea Athletic Field Park; Playground Equipment, Little League and Baseball Fields, Pavilion, Foodbooth, Lighted Softball Field, Basketball Courts, Comfort Station (11.73 Ac.)

Waimea Athletic Field Park 2008-07-25.mxd



Survey of Kauai County Parks 2008-08-06.mxd

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.

Waioli Town park 2016-08-02.cdr

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A message brought to you by

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“Ho’okahi no hua a ka ‘a’o”

Prepared For:	Prepared By:	Source:	Project:	Attachment C:
Kauai County	PLANNING SOLUTIONS	PSI	Kauai County KSHCP Application	**Limited Exterior Lighting**

Prepared For:	Prepared By:	Source:	Project:	Attachment D:
Kauai County	PLANNING SOLUTIONS	PSI	Kauai County KSHCP Application	**Substantial Exterior & Court Lighting**

Attachment D - Substantial Exterior & Court Lighting 2016-09-06.cdr

Prepared For:	Prepared By:	Source:	Project:	Attachment E:
Kauai County	PLANNING SOLUTIONS	PSI	Kauai County KSHCP Application	**High-Intensity Stadium Lighting**

Attachment E - High Intensity Stadium Lighting 2016-09-06.cdr

Prepared For:	Prepared By:	Source:	Project:	Attachment F:
Kauai County	PLANNING SOLUTIONS	PSI	Kauai County KSHCP Application	**Field Lighting**

Attachment F - Field Lighting 2016-09-06.cdr

	POLICY AND STANDARD OPERATING PROCEDURE	Documentation Number:
County of Kauai	USE OF FLOOD LIGHTS ON COUNTY FACILITIES	Revision

POLICY: It is the policy of the County of Kaua'i to manage the use of temporary flood lights on County of Kaua'i 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 Kaua'i 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.

Prepared by: kt	**Date last revised:**	Page 1 of 2
Original release date: 03/20/11	**Reviewed by :** **Approved by:** **BERNARD CARVALHO, Jr.** **Mayor**	

- 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.*"

OFFICE OF THE COUNTY ATTORNEY
THE COUNTY OF KAUA'I

DEREK S. K. KAWAKAMI, MAYOR
MICHAEL A. DAHILIG, MANAGING DIRECTOR

MATTHEW M. BRACKEN
COUNTY ATTORNEY

NICHOLAS R. COURSON
FIRST DEPUTY

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. <u>Documentation and Notification.</u>

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

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.

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Attachment A - County Facility Listing to the KSHCP

Placeholder

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Attachment C - Monitoring Plan

Category 3 Limited External Lighting - Representative facility: Līhuʻe Civic Center

The search strategy employed at Līhuʻe 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 Līhuʻe 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.

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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.

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Category 5 High-Intensity Stadium & Field Lighting - Representative facility: Vidinha Stadium.

The search strategy employed at Vidihina 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.

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122
Honolulu, Hawaii 96850

In Reply Refer To:
01EPIF00-2018-TA-0435

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 whom 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.

e. 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 M Abrams
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.

KSHCP Participant Inclusion Plan (PIP)

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
Eleele, Hawaii 96705

Mailing Address:
Harbors Administration Kauai District
3242 Waapa Road
Lihue, Hawaii 96766

Primary Contact:
Ownership Name:
Address:

Email:
Telephone:

Alternate Contact:
Name:
Address:

Telephone:
Email:

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

Primary Contact:
Ownership Name:
Address:

Email:
Telephone:

Alternate Contact:
Name:
Address:

Telephone:
Email:

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

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.

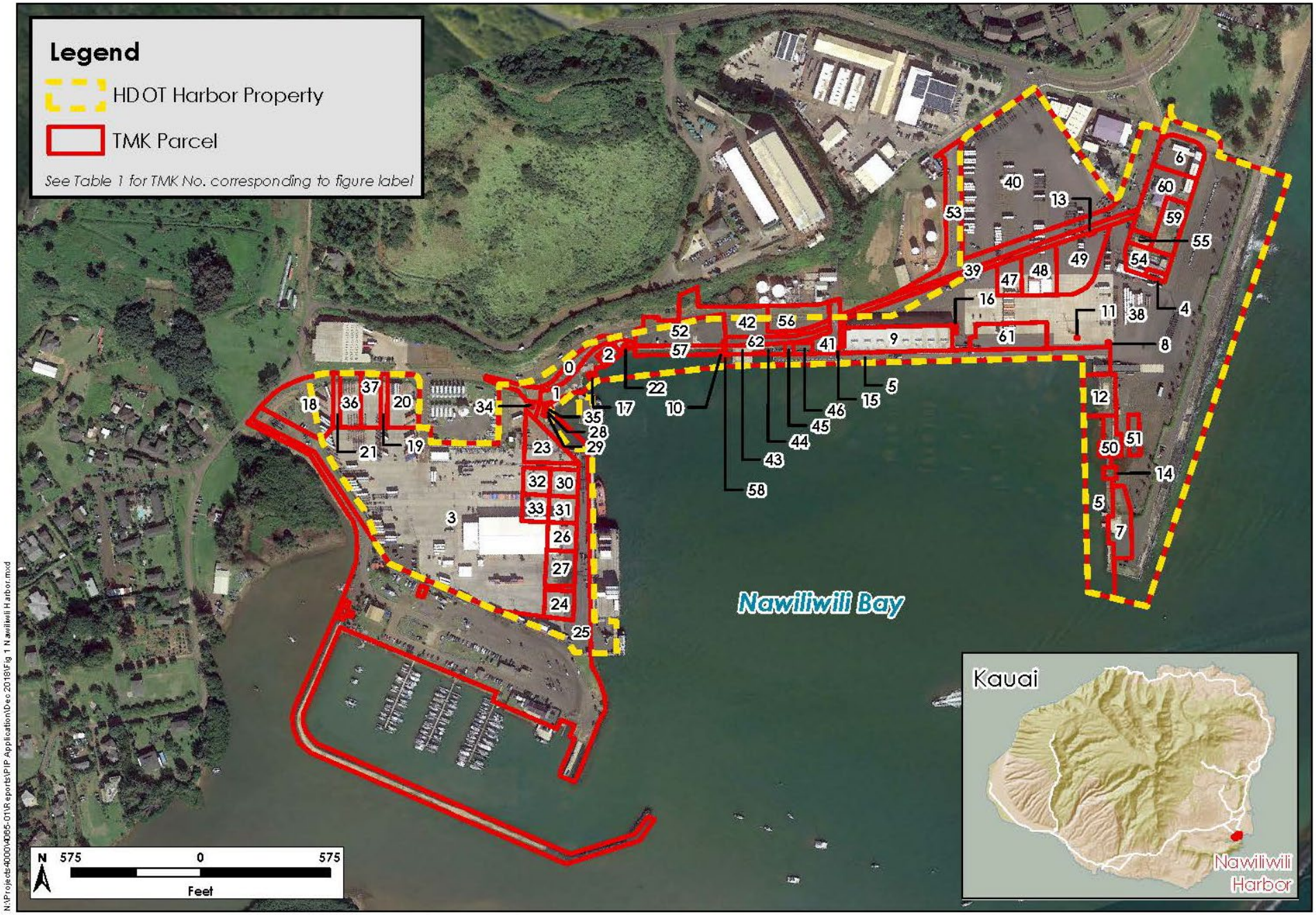
Label ID	TMK No.	Amount
0	421003021	
1	421003033	
2	421003006	Partial
3	421003015	
4	421003022	
5	421003019	Partial
6	421003020	

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.

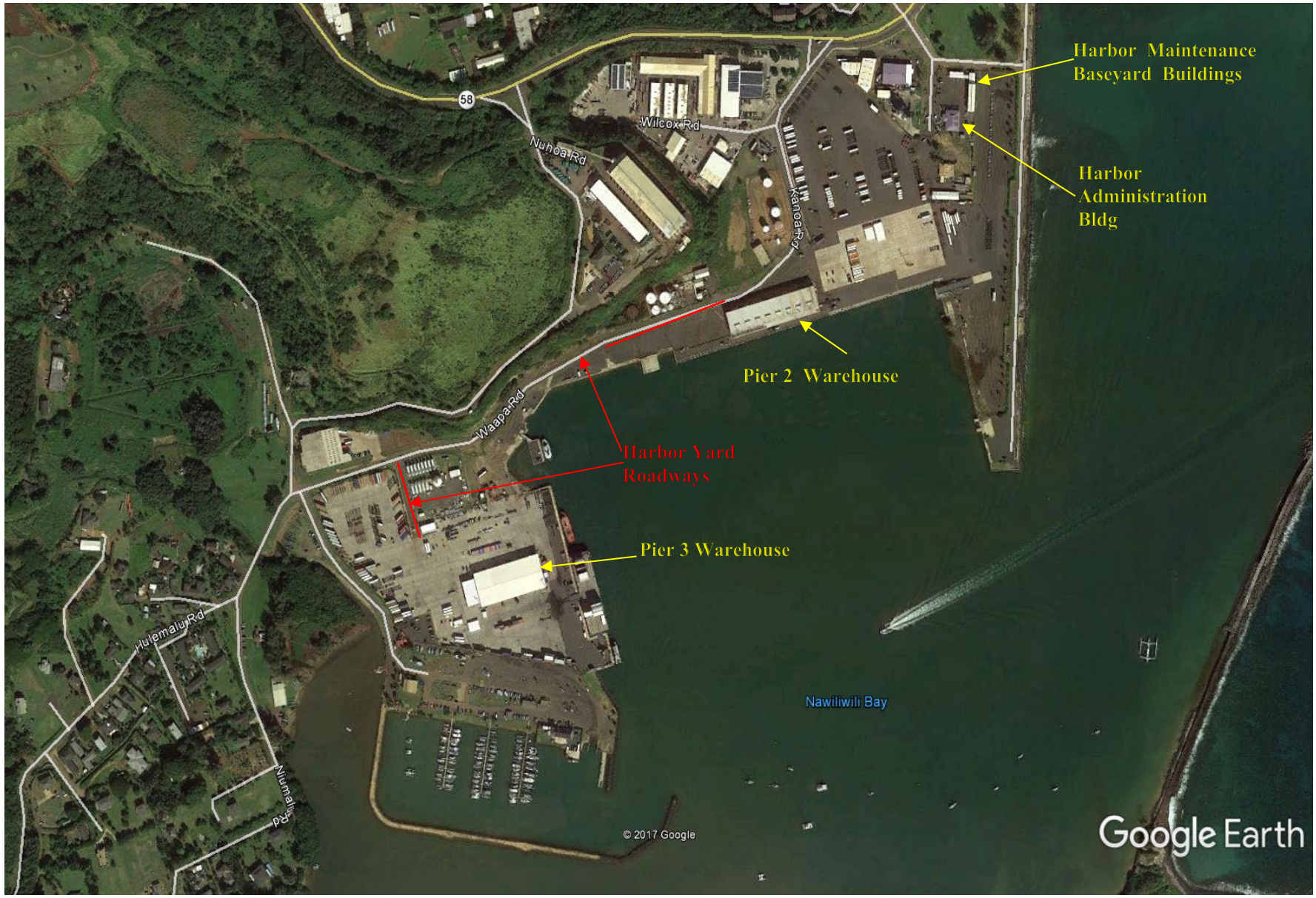
Kauai Harbors Table 1. A List of the Nawiliwili Harbor Tax Map Key Parcels Being Covered under the KSHCP and Referenced in Kauai Harbors Figure 1

Label ID	TMK No.	Amount	Label ID	TMK No.	Amount
0	432003001		34	432003055	
1	432003002		35	432003057	
2	432003003		36	432003072	
3	432003007	Partial	37	432003073	
4	432004052		38	432004002	Partial
5	432004054		39	432004008	Partial
6	432004057		40	432004015	
7	432004059		41	432004018	Partial
8	432004061		42	432004019	Partial
9	432004063		43	432004024	
10	432004064		44	432004025	
11	432004065		45	432004026	
12	432004067		46	432004027	
13	432004070		47	432004028	
14	432004072		48	432004029	
15	432004074		49	432004030	
16	432004075		50	432004031	
17	432003023		51	432004032	
18	432003031	Partial	52	432004034	Partial
19	432003032		53	432004035	Partial
20	432003033		54	432004036	
21	432003038		55	432004037	
22	432003040		56	432004039	Partial
23	432003041		57	432004042	
24	432003042		58	432004043	
25	432003043	Partial	59	432004044	
26	432003045		60	432004048	
27	432003046		61	432004051	
28	432003047		62	432003999	
29	432003048				
30	432003051				
31	432003052				
32	432003053				
33	432003054				

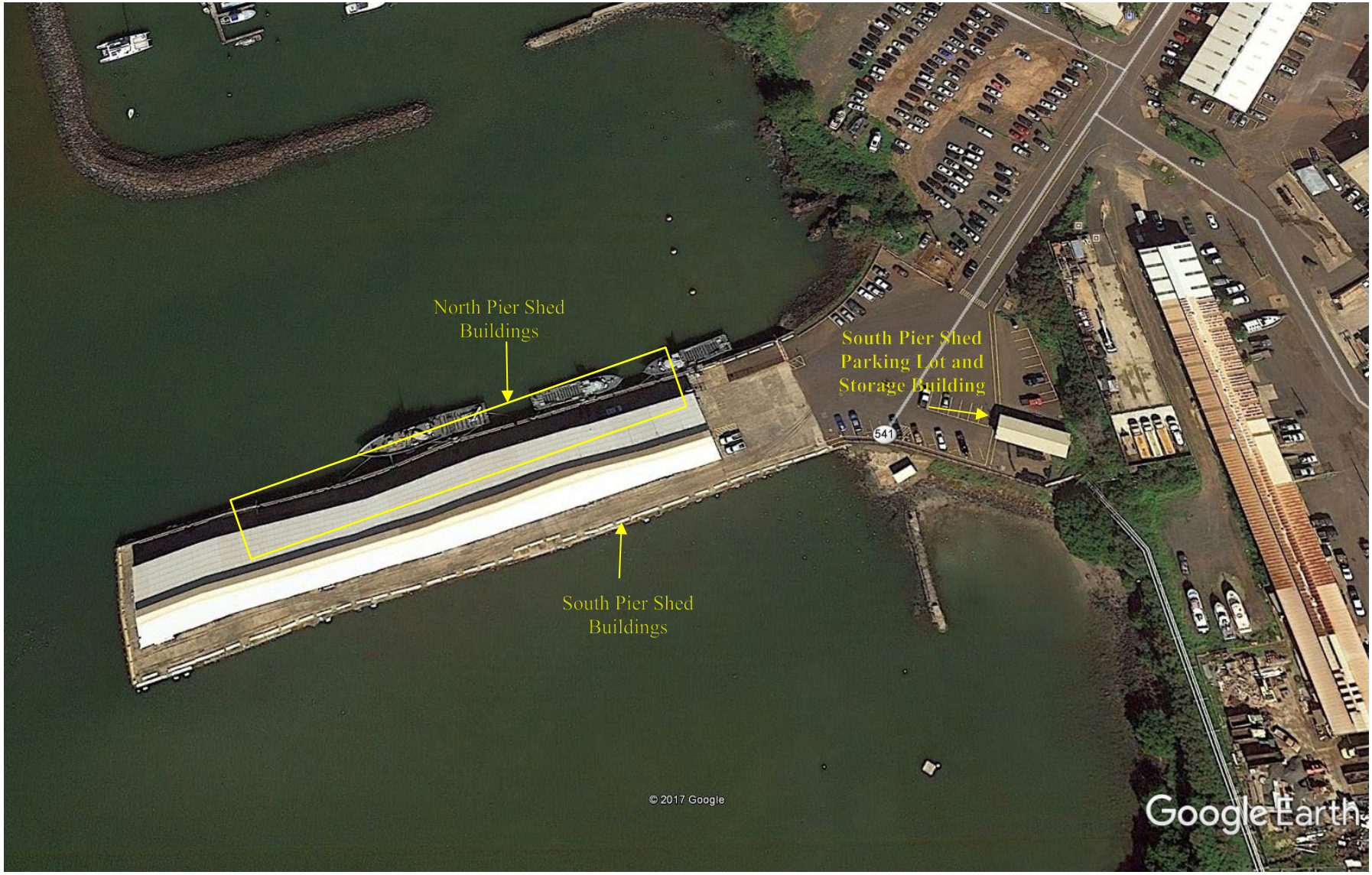


Kauai Harbors Figure 1. Nawiliwili Harbor Tax Map Key Parcel Boundaries

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.

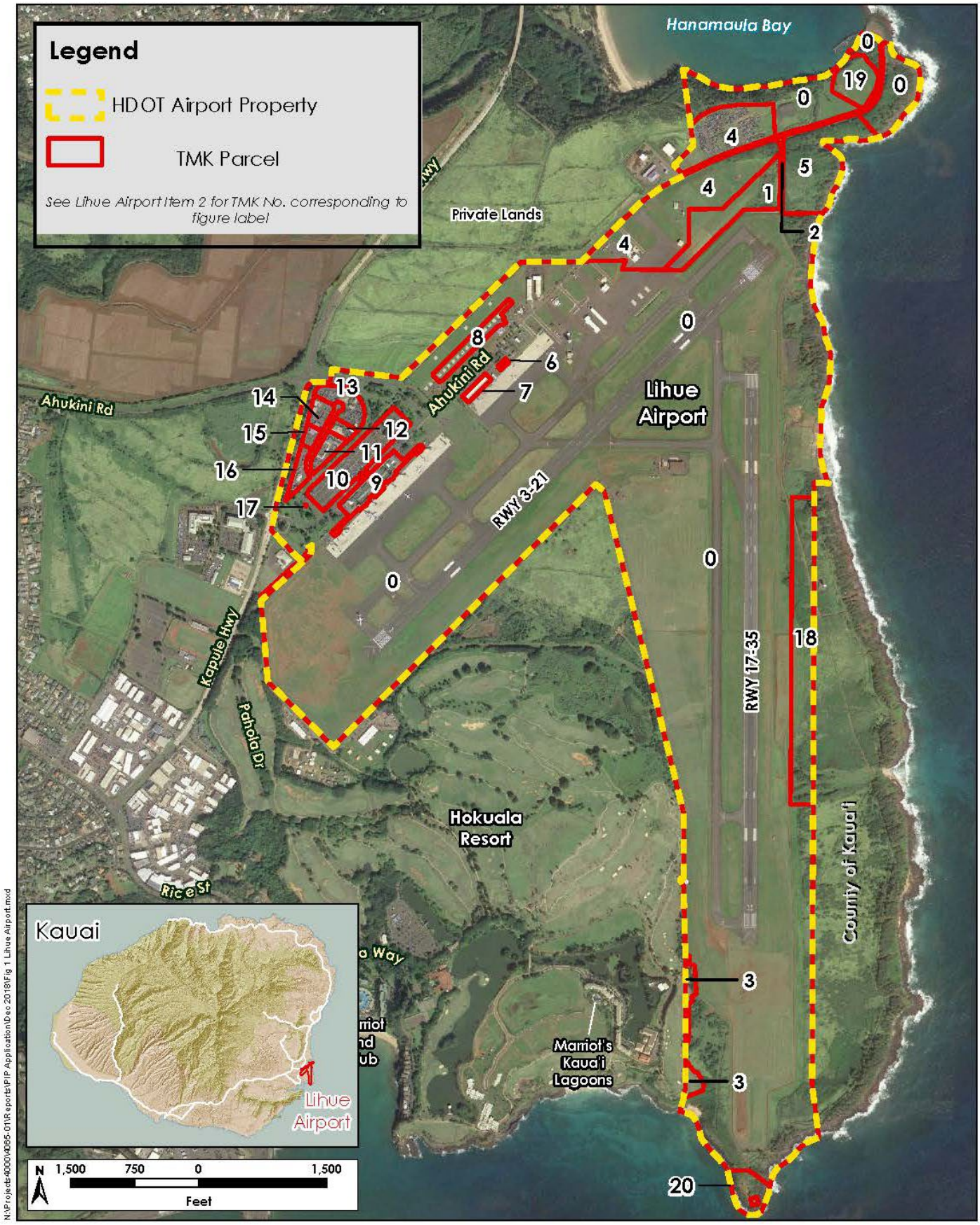
See Lihue Airport Figures 1 and 2, depicting the Lihue Airport (915 Acres, 1.5 miles east of Lihue, 153 feet above mean sea level):

__X__ 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.

Label ID	TMK No.	Amount
0	435001008	
1	435001009	
2	435001092	
3	435001109	
4	435001158	
5	435001160	
6	435001147	
7	435001146	
8	435001148	
9	435001135	
10	435001091	
11	435001134	
12	435001133	
13	435001132	
14	435001131	
15	435001130	
16	435001129	
17	435001137	
18	435001005	
19	435001159	
20	435001128	Partial

__X__ Lihue Airport survey map (Lihue Airport Figure 1)
__X__ 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 Marriot 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 (USGC) 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 designed 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 Eleele 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

List of Buildings/ Facilities	Type/Description of Lights Present	Location	Purpose of the Lights	Describe any measures implemented to avoid or minimize take impacts to Covered Species
Harbor Yard	LED High-mast Lighting, Pole mounted at 82 ft high, 4000K, Dimmable (Holophane HMLED2 12 4K)	Paved container yard supporting Piers 1, 2, and 3	To provide operational safety and port security for yard operations, dock operations, yard storage, and yard parking areas	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.
Harbor Yard Roadways	LED High-mast Lighting, Pole mounted at 28-44 ft high, 4000K, (Holophane HMLED2 06 4K)	Internal roadway between Piers 2 and 3	To provide operational safety and port security for internal yard roadway	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.
	LED Roadway Lighting, D series area luminaire, Pole mounted at 30 ft high, 4000K, (Lithonia DSX0 LED 20C 1000 40K)	Paved roadway off Waapa Road to Young Brothers entry gate to Pier 3.	To provide operational safety and port security for access roadway off Waapa Road	Downward pointed, full cut-off fixtures are compliant with night sky protection strategy under HRS Section 201-8.5.
Harbor Administration Building	LED Wall-pack Building Lights, 4000K. (RAB WPLED13N/PC2	Harbor Administration Offices Compound	To provide operational safety and security for harbor administrative office compound	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.
	LED Recessed Ceiling Mount Downlight Building Lights, 4000K, (Precision RF6LED5G4-277)	Harbor Administration Offices Compound	To provide operational safety and security for harbor administrative office compound	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.
	LED Ceiling Mount Canopy Downlight Building Lights, 4000K, (Cree CPY250-A-DM-F-C-UL-SV-PML)	Harbor Administration Offices Compound	To provide operational safety and security for harbor administrative office compound	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.

List of Buildings/ Facilities	Type/Description of Lights Present	Location	Purpose of the Lights	Describe any measures implemented to avoid or minimize take impacts to Covered Species
Harbor Maintenance Baseyard Buildings	LED Wall-pack Building Lights, 4000K. (RAB WPLED13N/PC2)	Harbor Administration Compound	To provide operational safety and security for harbor administrative office compound	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.
	LED Flood Light Fixture – Flood or shoebox mount, LED, 4000K, (Holophane PMLED-03-4K)	Harbor Administration Compound	To provide operational safety and security for harbor administrative office compound	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.
	LED Ceiling/wall mount Florescent Strip Fixture; 4000K, (Precision SIL-1X8-XL-F-UL-40K-CW8-JP)	Harbor Administration Compound	To provide operational safety and security for harbor administrative office compound	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.
Warehouse Pier 2 Building (occupied by Matson)	LED Wall-pack Building Lights, 4000K, dusk to dawn timer. (RAB WPLED3T78NW/PC2)	Pier 2	To provide operational safety and security for Matson processing and storage facilities.	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.
	LED Flood Light Fixture, Flood or shoebox mount, 4000K, (Holophane PMLED-04-4K)	Pier 2	To provide operational safety and security for Matson processing and storage facilities	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.
Warehouse Pier 3 Building (occupied by Young Brothers)	LED High Bay Fixture, ceiling mounted high bay, 4 LED modules, 4000K, (Cree PKG-304-5M-DM-04)	Pier 3	To provide operational safety and security for Young Brothers processing and storage facilities	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.

Kauai Harbors Table 3. Outdoor Lighting at Port Allen Harbor

List of Buildings	Type/Description of Lights Present	Location	Purpose of the Lights	Describe any measures implemented to avoid or minimize take impacts to Covered Species
Port Allen South Pier Shed Buildings	LED Wall-pack Building Lights, 4000K, dusk to dawn timer (RAB WPLED13N/PC2, RAB WPLED18N/PC2, RAB WPLED26N/PC2)	South Pier Shed Berths Walls	To provide operational safety and security for harbor offices, tenants, and the public	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.
Port Allen South Pier Shed Buildings	LED Flood Light Fixture, Flood mount, 4000K (Holopane PMLED-03-4K, Holopane PMLED-04-4K)	South Pier Shed Walkway, Berth Walls	To provide operational safety and security for harbor offices, tenants, and the public	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.
Port Allen South Pier Shed Parking Lot	LED Flood Light Fixture, Flood mount on side of building, 4000K (Holopane PMLED-03-4K, Holopane PMLED-04-4K)	South Pier Shed East End Parking Lot	To provide operational safety and security for harbor offices, tenants, and the public	Downward pointed, full cut-off function achieved by aiming angle and are compliant with night sky protection strategy under HRS Section 201-8.5.
Port Allen South Pier Parking Lot Storage Shed	LED Flood Light Fixture, Flood mount, 4000K (Holopane PMLED-03-4K, Holopane PMLED-04-4K)	South Pier Storage Building at back of Parking Lot	To provide operational safety and security for harbor offices, tenants, and the public	Downward pointed, full cut-off function achieved by aiming angle, wall-pack building light mounted under eaves.
Port Allen North Pier Shed Buildings	LED Wall-pack Building Lights, 4000K	North Pier Shed	To provide operational safety and security for U.S. Navy PMRF pier facilities	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.
	LED Flood Light Fixture, Flood mount, 4000K	North Pier Shed	To provide operational safety and security for U.S. Navy PMRF pier facilities	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.

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.		
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**
Nawiliwili Harbor	No	
Port Allen Harbor	No	
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**
Nawiliwili Harbor	No	
Port Allen Harbor	No	
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**
Nawiliwili Harbor	No	
Port Allen Harbor	No	

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.

Lihue Airport Table 1. Outdoor Lighting at Lihue Airport

List of Buildings/ Facilities	Type/Description of Lights Present	Location	Purpose of the Lights	Describe any measures implemented to avoid or minimize take impacts to Covered Species
Main Ramp/Apron (Aircraft Operating Area)	HPS High-mast Lighting, Pole-Mounted Flood Fixture, High Pressure Sodium, (6) 1000W lamps, on timer from dusk to 12:30 a.m.	The aircraft apron, ramp and taxiways servicing the main passenger terminal.	To provide operational safety and security for aircraft movement, servicing, maintenance, baggage handling, and passenger service	Downward pointed, full cut-off function achieved by aiming angle, turned off at 12:30 am after the last flight departs for the night.
	HPS Apron Flood Lighting, Pole-Mounted Flood Fixture, High Pressure Sodium, (4) 1000W lamps			Downward pointed, full cut-off function achieved by aiming angle, turned off at 12:30 am after departure of the last flight.
	LED Wall-pack Building Lights, 4000K, (Cree SEC EDG 3MB WM 04 D 40k)			Downward pointed, full cut-off fixture.
	LED Wall-pack Building Lights, 4000K, (RAB WPLED18N)			Downward pointed, full cut-off fixture.
Terminal Building (Public Access)	LED Wall-pack Building Lights, 4000K, (Cree SEC EDG 3MB WM 04 D 40k)	Main terminal public access areas, vehicle and pedestrian access	To provide operational safety and security for public, airport workers, and tenants.	Downward pointed, full cut-off fixture
	LED Wall-pack Building Lights, 4000K, (RAB WPLED13N)			Downward pointed, full cut-off fixture
	LED Ceiling Mount High Bay Parking Structure Luminaire, 4000K, (Cree PKG 304 PS DM 04-40K)			Downward pointed, full cut-off fixture
	LED Ceiling Mount, Recessed Can, 4000K, (Precolite RLF6LEDG4 6LFLED7G4-40k)			Downward pointed, full cut-off fixture
	LED Ceiling Mount, High Bay Canopy Light, 4300K, (Cree CAN EDG 5S DM 04 43K)			Downward pointed, full cut-off fixture
Terminal Building (Public Access Indoor Lighting)	LED Interior Indoor Lights Visible from Outside. LED Fluorescent Light. On motion sensor to dim to 10% level when not occupied.	Main terminal public access passenger holding areas, pedestrian access	To provide operational safety and security for public, airport workers, and tenants.	Internal building lighting, passenger holding areas on motion sensor to dim to 10% level when not occupied.

List of Buildings/ Facilities	Type/Description of Lights Present	Location	Purpose of the Lights	Describe any measures implemented to avoid or minimize take impacts to Covered Species
Public Parking Lot	LED Pole Mounted Parking Lot Light, 4000K, Solar Powered dusk to dawn timer. Holophane - ATB2 40BLEDE70 120 R2 GY NR DCDRIVER & 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)	Public Car Park	To provide public safety and security for visitors to airport and enable surveillance of parking areas to maintain airport security.	Downward pointed, full cut-off fixture Downward pointed, full cut-off fixture
Rental Car Lots (public access road)	LED Roadway Light, LED Pole Mounted, 4000K, Solar Powered dusk to dawn timer. (Holophane - ATB2 40BLEDE70 120 R2 GY NR DCDRIVER & EG-340)	Rental car facilities access road	To provide safe driving, walking and working conditions for public, workers, and businesses.	Downward pointed, full cut-off fixture.
Ahukini Road	LED Roadway Light, LED Pole Mounted, 4000K, Solar Powered dusk to dawn timer. (Holophane - ATB2 40BLEDE70 120 R2, R4, R5 GY NR DCDRIVER & EG-340) LED Sign Illumination, flood solar light, 2-light system, 2700K, dimmable. (Solar Illuminations FL57 2 lamp system 45W Panel)	Airport access road to main terminal, cargo and commuter terminal, and heliport Sign lighting along roadway	To provide safe driving, walking and working conditions for the public, airport workers, and tenants	Downward pointed, full cut-off fixture. Mounted above sign. Downward pointed
Cargo Ramp/Apron (Aircraft Operating Area)	HPS High-mast Lighting, Pole-Mounted Flood Fixture, High Pressure Sodium, (6) 1000W lamps HPS Apron Flood Lighting, Pole-Mounted Flood Fixture, High Pressure Sodium, (4) 1000W lamps MH Metal Halide Lighting, Pole-Mounted Flood Fixture, Metal Halide, (4) 750W lamps, Magnetic ballast	Aircraft apron, parking stalls, and taxiways for the main terminal	To provide operational safety and security for aircraft movement, servicing, and maintenance, baggage handling for passenger service.	Downward pointed, full cut-off function achieved by aiming angle. Downward pointed, full cut-off function achieved by aiming angle. Downward pointed, full cut-off function achieved by aiming angle.

List of Buildings/ Facilities	Type/Description of Lights Present	Location	Purpose of the Lights	Describe any measures implemented to avoid or minimize take impacts to Covered Species
Commuter Terminal and Cargo Building (Public Access)	LED Wall-pack Building Lights, 4000K, (Cree SEC EDG 3MB WM 04 D 40k)	Cargo and Commuter terminal public access areas, vehicle and pedestrian access	To provide operational safety and security for public, airport workers, and tenants and handling of cargo.	Downward pointed, full cut-off fixture
	LED Wall-pack Building Lights, 4000K, (RAB WPLED18N)			Downward pointed, full cut-off fixture
	LED Ceiling Mount, Recessed Can, 4000K, (Precolite RLF6LEDG4 6LFLED7G4-40k)			Downward pointed, full cut-off fixture
	LED Pole mounted shoebox area light, 4000K (Cree ARE EDG 3M DA 04 E 40K)			Downward pointed, full cut-off fixture
Heliport Apron (Aircraft Operating Area, T-hangers)	LED Wall-pack Building Lights, 4000K, (RAB WPLED13N)	Helicopter apron, T-Hangers, and service area within secure part of airport.	To provide safety and security for aircraft movement, servicing, and maintenance.	Downward pointed, full cut-off fixture, turned off when no operations are in progress.
	LED Area Flood Light, wall mounted, 4000K, (Cree ARE EDG 4M DA 10 E UL BZ 525 40K PML + WM2)			Downward pointed, full cut-off fixture, turned off when no operations are in progress.
	LED Area Flood Light, pole mounted, 4000K, (Cree ARE EDG 4M DA 10 E UL BZ 525 40K PML + WM2)			Downward pointed, full cut-off fixture, turned off when no operations are in progress.
	LED Area light, wall mounted, 4000K (Cree ARE EDG 4M AA 04 E UL BZ 700 40K R + WM-2)			Downward pointed, full cut-off fixture, turned off when no operations are in progress.
	LED Area Light, pole mounted shoebox fixture, 4000K, (Cree ARE EDG 3M DA 04 E UL BZ 525 R)			Downward pointed, full cut-off fixture, turned off when no operations are in progress.
	LED Roadway Light, LED Pole Mounted, 4000K, Solar Powered dusk to dawn timer. (Holophane - ATB2 40BLEDE70 120 R2 GY NR DCDRIVER & EG-340)			Downward pointed, full cut-off fixture.

List of Buildings/ Facilities	Type/Description of Lights Present	Location	Purpose of the Lights	Describe any measures implemented to avoid or minimize take impacts to Covered Species
Maintenance Area Building	LED Roadway Light, LED Pole Mounted, 4000K, Solar Powered dusk to dawn timer. (Holophane - ATB2 40BLEDE70 120 R2 GY NR DCDRIVER & EG-340)	Airport Maintenance Area across from Heliport and Cargo and Commuter Terminal	To provide operational safety and security for airport maintenance personnel and work.	Downward pointed, full cut-off fixture.
	LED Wall-pack Building Lights, 4000K, (Cree SEC EDG 3MB WM 04 D 40k)			Downward pointed, full cut-off fixture.
	LED Wall-pack Building Lights, 4000K, (Cree SEC EDG 4M WM 02 E - 40k)			Downward pointed, full cut-off fixture.
	LED Wall-pack Building Lights, 4000K, (RAB WPLED18N)			Downward pointed, full cut-off fixture
	LED Wall-pack Building Lights, 4000K, (RAB WPLED13N)			Downward pointed, full cut-off fixture
Fire Department	LED Flood light, Wall mounted, 4000K (Cree FLD EDG 70 AA 04 D UL BZ 525)	Airport airfield adjacent to runways	To provide operational safety and security for airport fire station, worker safety and facility security	Downward pointed, full cut-off function achieved by aiming angle
	LED Wall-pack Building Lights, 4000K, (Cree SEC EDG 3MB WM 04 D 40k			Downward pointed, full cut-off fixture
	LED Area Light, Pole mounted, 4000K, (Cree ARE EDG 3M DA 06 D UL BZZ 700 40K P)			Downward pointed, full cut-off fixture
	LED Ceiling Mount, Recessed Can, 4000K, Dimmable (Precolite RLF6LEDG4 6LFLED7G4-40k)			Downward pointed, full cut-off fixture

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.		
Are any of the facilities located adjacent to a beach? **Lihue Airport**	**Yes / No** **No**	**If yes, provide length of beach frontage & brief description of facilities & lights adjacent to the beach**
Are any of the Covered Activities (lights) visible from a beach? **Lihue Airport**	**Yes / No** **No**	**If yes, describe the specific lights (type, quantity, height, purpose) & specific location; provide map & photos showing distance from beach**
Have green sea turtles been known to nest on any beaches adjacent to the facilities? **Lihue Airport**	**Yes / No** **No**	**If yes, provide information about nesting occurrences, if known, including location and date and any other information**

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.

U.S. Coast Guard Code of Federal Regulations Title 33, Chapter I, Subchapter H, Part 105 Maritime Security: Facilities, Subpart B Facility Security Requirements, Section 105.275 Security measures for monitoring, which reads as follows.

    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-candles 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.

[CGD 75-124, 45 FR 7172, Jan. 31, 1980, as amended by CGD 86-034, 55 FR 36253, Sept. 4, 1990]

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
https://www.faa.gov/documentLibrary/media/Advisory_Circular/150-5345-46E.pdf

Errata sheet for AC 150/5345-46E
https://www.faa.gov/documentLibrary/media/Advisory_Circular/errata-sheet-150-5345-46E.pdf

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)
https://www.faa.gov/documentLibrary/media/Advisory_Circular/150-5300-13A-chg1-interactive-201705.pdf

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 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.

Kauai Harbors Table 5. Light Attraction Alternatives to the Taking—Nawiliwili Harbor

Artificial Light Attraction Alternatives to the Taking Considered	Reasons Alternatives Are Not Being Utilized (Provide Justification)
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)**	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.
Avoidance Alternative-Restricted Usage of Lighting Alternative: **Change operations to eliminate the need for outdoor artificial lighting (e.g., from nighttime to daytime hours)**	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.
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)**	Nawiliwili Harbor: Not applicable. No beach area is adjacent to Nawiliwili Harbor.
Other alternatives to the taking considered, if any. If facility is proposed, include alternative designs considered	Not applicable.

Kauai Harbors Table 6. Light Attraction Alternatives to the Taking— Port Allen Harbor

Artificial Light Attraction Alternatives to the Taking Considered	Reasons Alternatives Are Not Being Utilized (Provide Justification)
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)**	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.
Avoidance Alternative-Restricted Usage of Lighting Alternative: **Change operations to eliminate the need for outdoor artificial lighting (e.g., from nighttime to daytime hours)**	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.
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)**	Port Allen: Not applicable. No beach areas are adjacent to Port Allen Harbor.
Other alternatives to the taking considered, if any. If facility is proposed, include alternative designs considered	Not applicable.

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

Artificial Light Attraction Alternatives to the Taking Considered	Reasons Alternatives Are Not Being Utilized (Provide Justification)
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.

Kauai Harbors Table 7. Seabird Light Attraction Minimization Measures Considered—Nawiliwili Harbor

Minimization Measures Considered	Feasible? (Y/N)	If Not Feasible, Provide Reason
Change time of light use (lights off earlier)	**Partially**	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).
Deactivate unnecessary lights	**Partially**	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.
Replace all outdoor lights with full cut-off fixtures	**Yes**	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.
Shield all outdoor lights with full cut-off shields	**Yes**	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.
Angle all lights downward	**Yes**	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.
Lower intensity (lumens) of outdoor lights	**Partially**	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).
Change bulb color to non-white spectrum	**No**	The new LED lights installed by HDOT-H are phosphor coasted 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

Minimization Measures Considered	Feasible? (Y/N)	If Not Feasible, Provide Reason
		implementation of future improvements will depend on securing funding for construction through the legislative budget process.
Lower height of light poles	**No**	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).
Prohibit/control unleashed predatory animals; prohibit outdoor feeding of animals; require sealed rubbish containers	**Yes**	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.
Provide Worker Seabird Awareness Training to staff	**Yes**	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.
Provide outreach materials to staff & visitors	**Yes**	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 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.
Host Save Our Shearwaters (SOS) Aid Station	**Partially**	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.

Kauai Harbors Table 8. Seabird Light Attraction Minimization Measures Considered—Port Allen Harbor

Minimization Measures Considered	Feasible? (Y/N)	If Not Feasible, Provide Reason
Change time of light use (lights off earlier)	**Partially**	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 night 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.
Deactivate unnecessary lights	**Partially**	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 night 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.
Replace all outdoor lights with full cut-off fixtures	**Yes**	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.
Shield all outdoor lights with full cut-off shields	**Yes**	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.
Angle all lights downward	**Yes**	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.
Lower intensity (lumens) of outdoor lights	**Partially**	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 night 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).
Change bulb color to non-white spectrum	**No**	The new LED lights installed by HDOT-H are phosphor coasted 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

Minimization Measures Considered	Feasible? (Y/N)	If Not Feasible, Provide Reason
		safety. Non-white spectrum bulbs would have to meet the foot–candle illumination required for safety and security. The implementation of future improvements will depend on securing funding for construction through the legislative budget process.
Lower height of light poles	**No**	Not applicable; there are no pole lights at the facility.
Prohibit/control unleashed predatory animals; prohibit outdoor feeding of animals; require sealed rubbish containers	**Yes**	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
Provide Worker Seabird Awareness Training to staff	**Yes**	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.
Provide outreach materials to staff & guests	**Yes**	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.
Host Save Our Shearwaters (SOS) Aid Station	**No**	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.

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

Minimization Measures Considered	Feasible? (Y/N)	If Not Feasible to Implement Measures, Provide Reason
Change time of light use (lights off earlier)	**Partially**	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. Shutting 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.
Deactivate unnecessary lights	**Partially**	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. Shutting 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.
Replace all outdoor lights with full cut-off fixtures	**Partially**	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).

Minimization Measures Considered	Feasible? (Y/N)	If Not Feasible to Implement Measures, Provide Reason
Shield all outdoor lights with full cut-off shields	**Partially**	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 buildings, 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).
Angle all lights downward	**Yes**	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 buildings, and 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).
Lower intensity (lumens) of outdoor lights	**No**	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).
Change bulb color to non-white spectrum	**No**	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

Minimization Measures Considered	Feasible? (Y/N)	If Not Feasible to Implement Measures, Provide Reason
		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.
Prohibit/control unleashed predatory animals; prohibit outdoor feeding of animals; require sealed rubbish containers	**Yes**	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.
Provide Worker Seabird Awareness Training to staff	**Yes**	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.
Provide outreach materials to staff & guests	**Yes**	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.
Host Save Our Shearwaters (SOS) Aid Station	**Partially**	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.

Kauai Harbors Item 8. <u>Minimization Plans</u>. 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

List of Buildings/Facilities	Minimization Measures	Cost to Implement	Responsible Staff	Timeline
Container yard pole lights – High-mast Lights	1. Install full cut-off fixtures 2. Reduce number of lights activated when operations not in progress	$843,292 $0	Harbors Kauai District Manager; Engineering	Completed 2017 2018 and ongoing
Container Yard Roadway lights	1. Install full cut-off fixtures 2. Reduce number of lights activated when operations not in progress	$4,517 $0	Harbors Kauai District Manager; Engineering	Completed 2017 2018 and ongoing
Harbor Administration Building lights	1. Install full cut-off fixtures 2. Reduce number of lights activated when operations not in progress	$79,179 $0	Harbors Kauai District Manager; Engineering	Completed 2017 2018 and ongoing
Harbor Maintenance Compound Building lights	1. Install full cut-off fixtures 2. Test and install additional shielding on floodlights 3. Reduce number of lights activated when operations not in progress	$44,610 $4,000 $0	Harbors Kauai District Manager; Engineering	Completed 2017 2018 2018 and ongoing
Warehouse Pier 2 Building lights (occupied by Matson)	1. Install full cut-off function 2. Test and install additional shielding on floodlights 3. Reduce number of lights activated when operations not in progress	$138,049 $4,000 $0	Harbors Kauai District Manager; Engineering	Completed 2017 2018 2018 and ongoing
Warehouse Pier 3 Building lights (occupied by Young Brothers)	1. Install full cut-off function 2. Reduce number of lights activated when operations not in progress	$99,913 $0	Harbors Kauai District Manager; Engineering	Completed 2017 2018 and ongoing

Kauai Harbors Table 10. Light Attraction Avoidance and Minimization Plan—Port Allen Harbor

List of Buildings/Facilities	Minimization Measures	Cost to Implement	Responsible Staff	Timeline
South Pier				
Port Allen South Pier Shed Buildings Wall-pack building lights	1. Install downward-pointing, full cut-off fixtures 2. Reduce number of lights activated. 3. Turn off external lights when work is completed.	$23,502 $0 $0	Harbors Kauai District Manager; Harbors Engineering	Completed 2017 2018 and ongoing 2018 and ongoing
Port Allen South Pier Parking Lot Wall-pack flood lights	1. Install downward-pointing fixture with full cut-off function achieved by aiming angle 2. Test and install additional shielding on floodlights	$20,603 $4,000	Harbors Kauai District Manager; Harbors Engineering	Completed 2017 2018

Kauai Harbors Table 11. Seabird Mortality Minimization Plan—Nawiliwili Harbor

Minimization Measures	Describe Minimization Method (e.g., Trapping, Outreach, Enact Policy)	Cost to Implement	Responsible Staff
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.)	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).	$10,000	Harbors Kauai District 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.)	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).	$0	Harbors Kauai District Manager
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 $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

Minimization Measures	Describe Minimization Method (e.g., Trapping, Outreach, Enact Policy)	Cost to Implement	Responsible Staff
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.)	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).	$10,000	Harbors Kauai District 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.)	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).	$0	Harbors Kauai District Manager
Conduct nightly/morning searches to recover downed birds at the property and turn them into SOS following protocols (see monitoring plan below).	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.	$30,000 $0	Harbors Kauai District Manager Port Allen Harbor Agent
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

Lihue Airport Item 8. <u>Minimization Plans</u>. 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

List of Buildings/features	Avoidance and Minimization Measures	Cost to Implement	Responsible Staff	Timeline
Parking lot lights	**Minimization Measures** 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.	$8,029 $171,565	Airports Kauai District Manager Airports Kauai District Manager	Completed 2016 2018
Ahukini Road	**Minimization Measures** 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.	$4,003,204	Airports Kauai District Manager	Completed 2016
Signage lights	**Minimization Measures** 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.	$0 $0	Airports Kauai District Manager Maintenance	2018 Completed 2016
Main Terminal Apron, Cargo Apron, Commuter terminal lighting, helicopter maintenance lighting.	**Minimization Measures** 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	$1,798,367 $1,007,749 $8,000 $1,917,386 $0	Airports Kauai District Manager Airports Kauai District Manager Airports Kauai District Manager Airports Kauai District Manager Airports Kauai District Manager	Completed 2016 2018 2018 2020-2025 2018

List of Buildings/features	Avoidance and Minimization Measures	Cost to Implement	Responsible Staff	Timeline
	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.	$0	Airports Kauai District Manager	2018 and ongoing
Landscaping and grounds lighting	**Minimization Measures** 1. All grounds and accent lights will be directed downward by grounds maintenance staff.	$0	Maintenance	Completed 2017
Other minimization	A letter requiring compliance with seabird-friendly lighting standards will be sent to airport rental tenants as part of seabird awareness training.	$0	Airports Kauai District Manager	2018

Lihue Airport Table 6. Seabird Mortality Minimization Plan

Minimization Measures	Describe Minimization Method (e.g., Trapping, Outreach, Enact Policy)	Cost to Implement	Responsible Staff
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.)	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.	$10,000	District Manager
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.)	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).	$0	District Manager
Conduct nightly/morning searches to recover downed birds at the property and turn them into SOS following protocols (see monitoring plan below).	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.	$50,000	District Manager
Train staff to follow minimization measures.	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.	$0 (cost included in task above)	District Manager

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

Please provide the following information for the protocol items below		
Item	**Protocol** (fill in protocol and provide reasons)	**KSHCP Guideline**
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

Please provide the following information for the protocol items below		
Item	**Protocol** (fill in protocol and provide reasons)	**KSHCP Guideline**
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		
Item	**Protocol** (fill in protocol and provide reasons)	**KSHCP Guideline**
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

Please provide search protocols for detecting nests of the green sea turtle (Attach pages as needed)		
Item	**Protocol** (fill in protocol & provide reasons)	**KSHCP Guideline**
Location & description of the beach, or beaches, surveyed and the linear distance of the beach.	Not applicable	Beach area surveyed should coincide with visibility from the facility with the lights.
Frequency of searches (# per day or per week)	Not applicable	Every other day during nesting season (typ. May 15 to end of August)
Number of searchers per search area	Not applicable	Depends on site conditions and safety considerations
Proposed training	Not applicable	Searchers should receive annual training conducted by the DLNR or the USFWS, or their designee.

Kauai Harbors Table 16. 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)		
Item	**Protocol** (fill in protocol & provide reasons)	**KSHCP Guideline**
Frequency of checks (# per day or per week)	Not applicable	Active nests should be monitored every 1-2 days; then daily during expected hatching date
Light avoidance	Not applicable	If lights cannot be deactivated or shielded from the nest, each nest should be screened from visible light.
Number of searchers per search area	Not applicable	Depends on site conditions and safety considerations

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)		
Item	**Protocol** (fill in protocol and provide reasons)	**KSHCP Guideline**
Location and description of the beach, or beaches, surveyed and the linear distance of the beach.	Not applicable	Beach area surveyed should coincide with visibility from the facility with the lights.
Frequency of searches (# per day or per week)	Not applicable	Every other day during nesting season (typ. May 15 to end of August)
Number of searchers per search area	Not applicable	Depends on site conditions and safety considerations
Proposed training	Not applicable	Searchers should receive annual training conducted by the DLNR or the USFWS, or their designee.

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)		
Item	**Protocol** (fill in protocol and provide reasons)	**KSHCP Guideline**
Frequency of searches (# per day or per week)	Not applicable	Active nests should be monitored every 1-2 days; then daily during expected hatching date
Light avoidance	Not applicable	If lights cannot be deactivated or shielded from the nest, each nest should be screened from visible light.
Number of searchers per search area	Not applicable	Depends on site conditions and safety considerations

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 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.

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 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-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.
10. Complete the Bird Take Field Report.
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.
10. Complete the Bird Take Field Report.
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

Participant/Facility Name: Nawiliwili Harbor	Newell's Shearwater	Hawaiian Petrel[2]	Band-rumped Storm Petrel
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]	1.8	0.2	0.0
Adjustment for unobserved (50% typical, 10% as per SEEF Trials – Appendix C)	0.1	0.1	0.1
Total direct take from light attraction	2.0	0.22	0.0
Annual Take Estimate	2.0	0.22	0.0

[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

Participant/Facility Name: Port Allen Harbor	Newell's Shearwater	Hawaiian Petrel	Band-rumped Storm Petrel
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]	2.0	0.0	0.0
Adjustment for unobserved (50% typical)	0.5	0.5	0.5
Total direct take from light attraction	4.0	0.0	0.0
Annual Take Estimate	4.0	0.0	0.0

[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 fallout 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

Participant/Facility Name: Lihue Airport	Newell's Shearwater	Hawaiian Petrel	Band-rumped Storm Petrel[2]
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]	1.6	0.2	0.07
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).	0.25	0.25	0.25
Total direct take from light attraction	2.13	0.27	0.09
Annual Take Estimate	2.13	0.27	0.09

[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

Age Class	Annual Take Estimate: Fledglings	Annual Take Estimate: Adults or sub-adults	Take Limit for License/Permit Term (30 yrs)
Mortality (Lethal) (Lethal take = 10% undiscovered birds + 12% SOS birds that are not released = 22% of total take)	0.42	0.0	12.6
Injury (Non-lethal) (Annual take estimate – lethal take estimate)	1.58	0.0	47.4

Kauai Harbors Table 20. Requested take authorization and permit/license term coverage for ‘a ‘o - Newell’s Shearwater (*Puffinus Newelli*) at Port Allen Harbor

Age Class	Annual Take Estimate: Fledglings	Annual Take Estimate: Adults or sub-adults	Take Limit for License/Permit Term (30 yrs)
Mortality (Lethal) (Lethal take = 50% undiscovered birds + 12% SOS birds that are not released = 62% of total take)	2.24	0.0	67.2
Injury (Non-lethal) (Annual take estimate – lethal take estimate)	1.76	0.0	52.8

Kauai Harbors Table 21. Requested take authorization and permit/license term coverage for ‘ua‘u – Hawaiian Petrel (*Pterodroma sandwichensis*) at Nawiliwili Harbor

Age Class	Annual Take Estimate: Fledglings	Annual Take Estimate: Adults or sub-adults	Take Limit for License/Permit Term (30 yrs)
Mortality (Lethal) (Lethal take = 10% undiscovered birds + 12% SOS birds that are not released = 22% of total take)	0.04	0.0	1.2
Injury (Non-lethal) (Annual take estimate – lethal take estimate)	0.18	0.0	5.4

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

Age Class	Annual Take Estimate: Fledglings	Annual Take Estimate: Adults or sub-adults	Take Limit for License/Permit Term (30 yrs)
Mortality (Lethal) (*Lethal take = 25% undiscovered birds + 12% SOS birds that are not released = 37% of total take)*	0.72	0.0	21.6
Injury (Non-lethal) (*Annual take estimate – lethal take estimate*)	1.41	0.0	42.3

Lihue Airport Table 12. Requested take authorization and permit/license term coverage for ‘ua‘u – Hawaiian Petrel (*Pterodroma sandwichensis*) for Lihue Airport

Age Class	Annual Take Estimate: Fledglings	Annual Take Estimate: Adults or sub-adults	Take Limit for License/Permit Term (30 yrs)
Mortality (Lethal) (*Lethal take = 25% undiscovered birds + 12% SOS birds that are not released = 37% of total take)*	0.09	0.0	2.7
Injury (Non-lethal) (*Annual take estimate – lethal take estimate*)	0.18	0.0	5.4

Lihue Airport Table 13. Requested take authorization and permit/license term coverage for ʻakēʻakē –Band-Rumped Storm Petrel (*Oceanodroma castro*) for Lihue Airport

Age Class	Annual Take Estimate: Fledglings	Annual Take Estimate: Adults or sub-adults	Take Limit for License/Permit Term (30 yrs)
Mortality (Lethal) (*Lethal take = 25% undiscovered birds + 12% SOS birds that are not released = 37% of total take)*	0.03	0.0	0.9
Injury (Non-lethal) (*Annual take estimate – lethal take estimate*)	0.06	0.0	1.8

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[1].

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.

[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.

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[2].

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

Item		Completion Check Is each item thoroughly described and information submitted?	Complete? (Y/N)	Information Needed to Make Item Complete or Outstanding Issues Remaining
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		

3	Proof of Adequate Funding	▪ Financial mechanism ▪ Demonstrated ability to fund		
	Signature	Signed by landowner, facility owner, or authorized responsible party		

Lihue Airport PIP Completion Checklist Form

Item		**Completion Check** Is each item thoroughly described and information submitted?	**Complete? (Y/N)**	**Information Needed to Make Item Complete or Outstanding Issues Remaining**
Part I: Landowner & Property Information; Description of the Facilities; Avoidance & Minimization Measures; Monitoring of Take				
1	Landowner applicant information	▪ Landowner name/organization ▪ Contact information		
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5	Future facility plans	▪ Proposed plans provided ▪ Site plans, arch drawings, ▪ Other information		
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7	Minimization measures considered	▪ Minimization measures table (or other info.) completed ▪ Reasons provided ▪ Each Covered Activity ▪ Covered Seabirds and Honu		
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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		
3	Proof of Adequate Funding	▪ Financial mechanism ▪ Demonstrated ability to fund		
	Signature	Signed by landowner, facility owner, or authorized responsible party		

Appendix A. Technical Specifications of Outdoor Lights at Nawiliwili Harbor, Port Allen Harbor, and Lihue Airport, Kauai.

Johnson Controls

Lighting Material Manuals

Nawiliwili Harbor

HDOT Harbors, Highways, & Tunnels

JCI Contract: 4PX0-0031

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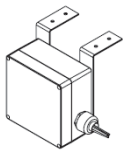
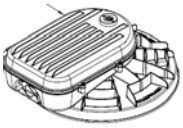
Catalog

Part Name	Image	Additional Description
ELWG0CXXGC		GE - LIGHTGRID GATEWAY
ELWK0A5		GE - LIGHTGRID NODE BOX ASSY 277V
ELWM0CXV		GE - LIGHTGRID CELLULAR MODEM
ELWN0A5		GE - LIGHTGRID NODE 277V
CREE CPY250-A-DM		CPY250-A-DM-F-UL-SV-PML
CREE CR14-22L Troffer		CR14-22L-40K-10V
CREE CR2220L Troffer		CR22-20L-40K-10V
Holo DSX0LED 40C 530		DSX0 LED 20C 530 40K T3M MVOLT
Holo HMLED2 06 4K-480V		HMLED2 12 4K AH G F P7 RFD211068

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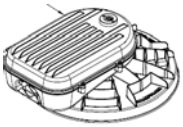
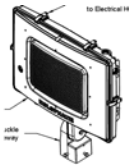
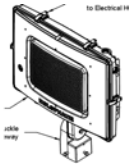
Catalog

Part Name	Image	Additional Description
Holo HMLED2 06 4K-480V		HMLED2 06 4K AH G F P7 RFD211069
Precision LLW2-40-LW-F-U		LLW2-40-LW-F-U
Precision LLW4-40-LW-F-U		LLW4-40-LW-F-U
CREE PKG-304		PKG-304-PD-04-E-UL-SV-525-PML
CREE PKG-304		PKG-304-PD-06-E-UL-SV-525-PML
Holo PMLED 03 4K-277V		PMLED-03-4K-07A-AS-66-1-L-ZP PMLED FV-Z
Holo PMLED 04 4K-277V		PMLED-04-4K-07A-AS-66-1-L-ZP PMLED FV-Z
Precision RF6LED5G4-277		RF6LED5G4-277-HDM-6LFLED5G4-40K-WH-WT

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Catalog

Part Name	Image	Additional Description
Precision SIL-1X4-XL		SIL-1X4-XL-F-UL-40K-CW8-JP
Precision SIL-1X8-XL		SIL-1X8-XL-F-UL-40K-CW8-JP
RAB WPLED13NPC2		WPLED13N/PC2
RAB WPLED 13N/PC2		WPLED13N/PC2

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ELWG-0-C-XX-G-C

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

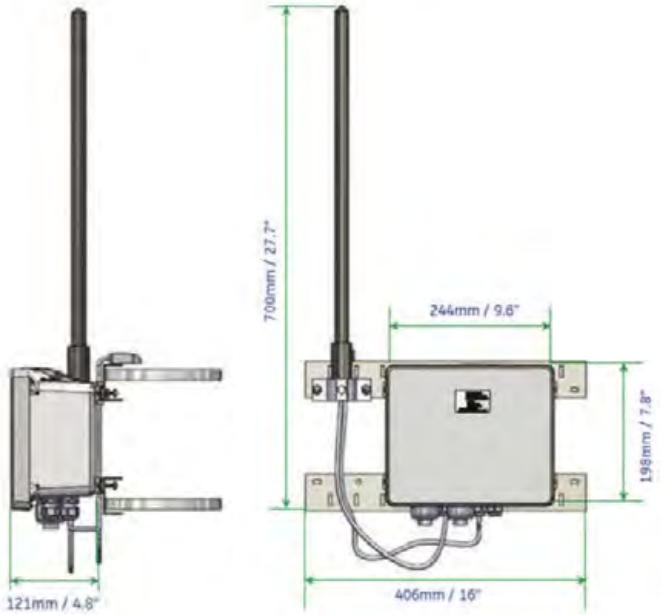
- Street Lighting
- Area Lighting

2014 PROGRESS Report SELECTION

Product Specifications

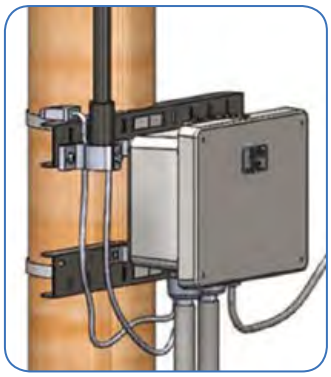
- Input Voltage: 120-277V, 347V—480V
- Operating Temperature: -40 to +50C
- Surge: Meets ANSI C62.41 6KV, 3KA Combination Wave
- Power Consumption: < 3W
- Frequency: 915 MHz ISM Band
- GPS: Accuracy 3m (clear open sky)
- Addressing: IPv6
- Security: AES Encryption, Certificate Based
- Network Communication: 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

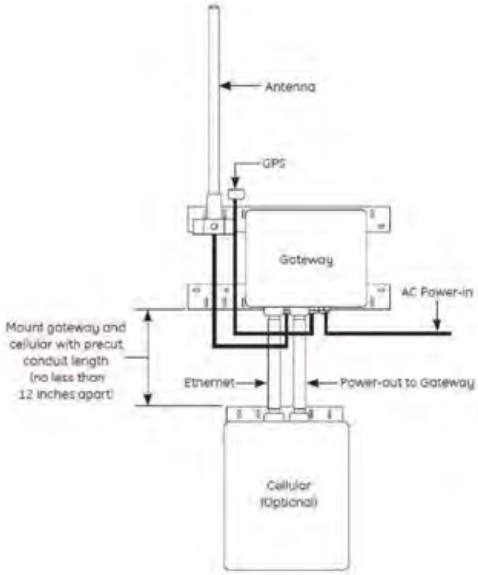
Product Dimensions



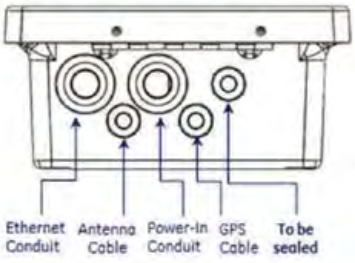
Installation

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.

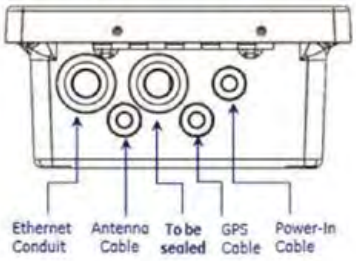




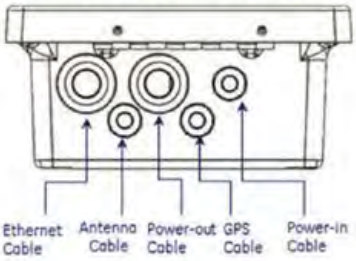
OPTION 1: Power & Ethernet input using conduit (**NO** power-out to external device)



OPTION 2: Power-in via cable. Ethernet in via conduit (**NO** power-out to external device)



OPTION 3: Power-in via cable; Power & Ethernet out to cellular modem via conduit



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

E L W G – – – – **C** – – **G** – **C** – –

PRODUCT ID	VOLTAGE (UL)	ANTENNA	COUNTRY/POLE	GPS	IP COMMUNICATION	NETWORK CONFIGURATION
E L W G	**0** = 120/277 **H** = 480* * 480V Gateway = 120-277V Gateway + 480V to 277V Step Down Transformer	**C** = Standard 18"	**XX** = Default (US) **AR** = Argentina **BR** = Braziil **EL** = El Salvador	**G** = GPS Capability	**C** = Cat 5 Cable Only	**B** = Network B **None** = Default

www.gelighting.com

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CTRL002 (Rev 06/10/15)

ELWM-0-C-X-V

GE
Lighting

LightGrid™ Cell Modem

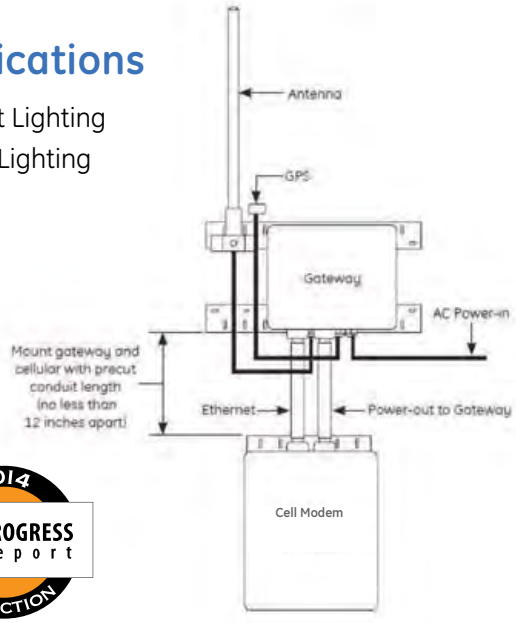
Outdoor Wireless Control System

Description

LightGrid™ Outdoor Wireless Control System from GE allows remote monitoring and control, utility-grade energy measurement and GPS mapping of streetlights.

Applications

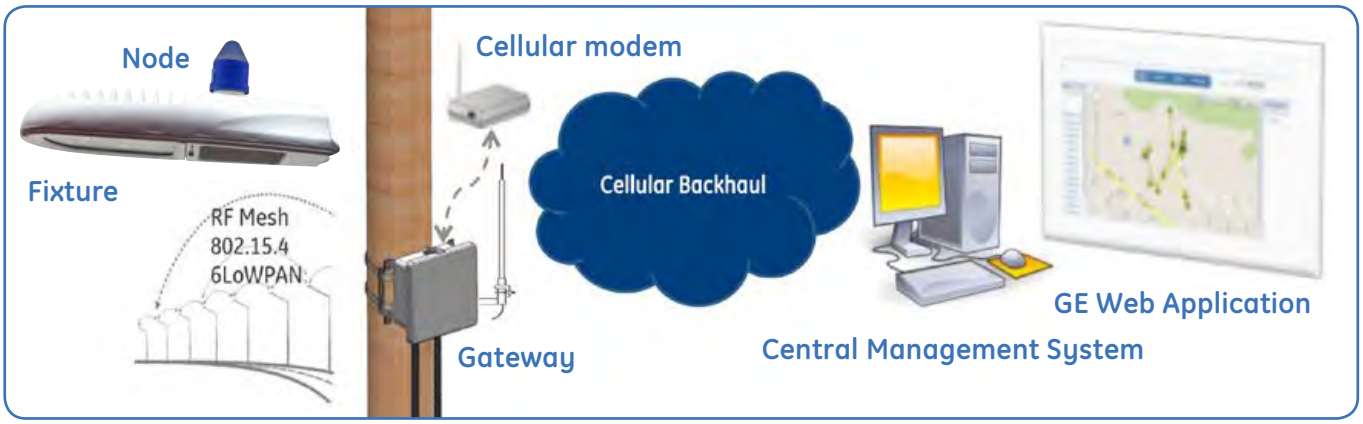
- Street Lighting
- Area Lighting



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)

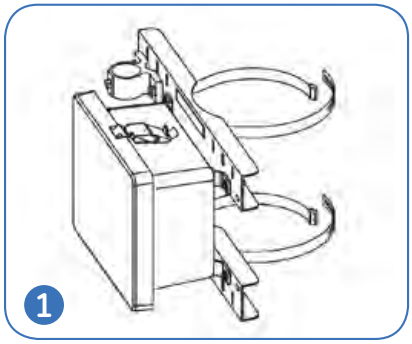
Ordering Number Logic

E L W M — O — C — X — _

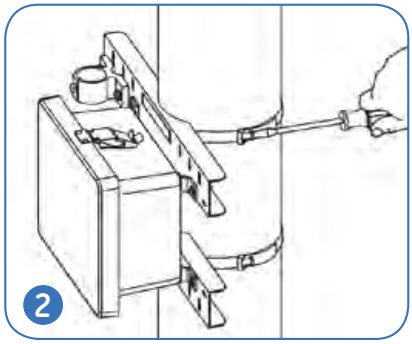
PRODUCT ID	VOLTAGE	IP COMMUNICATION	FUTURE USE	PROVIDER
E L W M	0 = 120-277	C = CAT 5 Cable only	X	V = Verizon R = Rogers X = Future Use

Mounting Gateway and Cellular

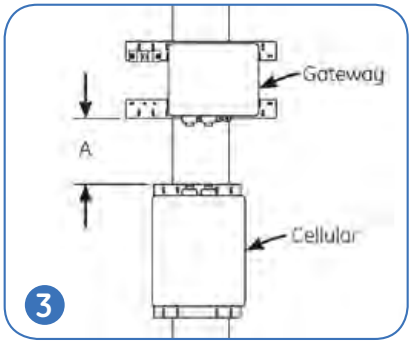
Carefully unpack unit from its packaging. Properly inspect for defects before installing.



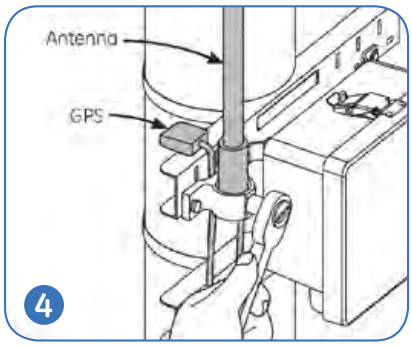
Before attaching gateway enclosure to pole, ensure the mount band clamps are correctly oriented. **NOTE:** Adjustable steel band allows mounting on pole diameters up to 15 inches.



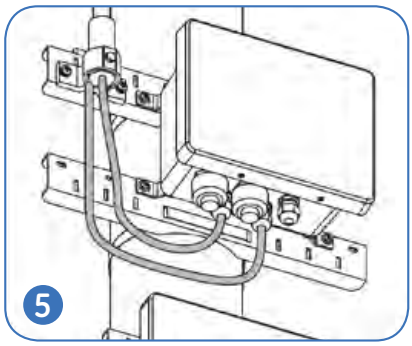
Attach gateway enclosure to pole by tightening steel band clamps. Fold or trim excess metal band if needed.



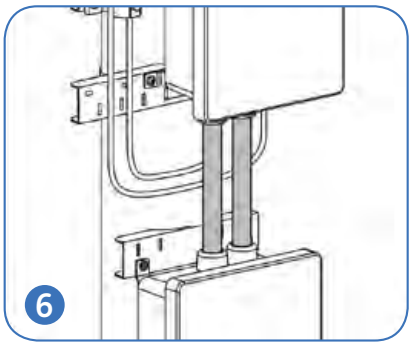
Position cellular enclosure below the gateway enclosure and attach to pole by tightening both steel band clamps. **NOTE:** The distance (A) between the two enclosures should be adjusted to accommodate the length of the Ethernet cable and power-in/out cable.



Install GPS and antenna into bracket and tighten bolt (45 lbs-in. torque).



Insert GPS and antenna wires through two glands in bottom of gateway enclosure.



Install two 0.75-inch diameter nonmetallic Type B liquid-tight conduit between gateway and cellular enclosures.

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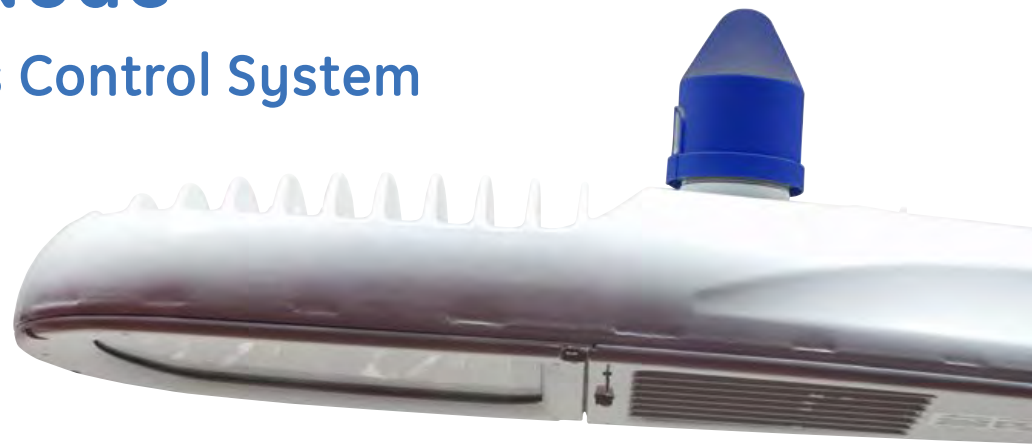
CTRL009 (Rev 06/10/15)

ELWN0A5

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.

Applications

- Street Lighting
- Area Lighting

2014 PROGRESS Report SELECTION

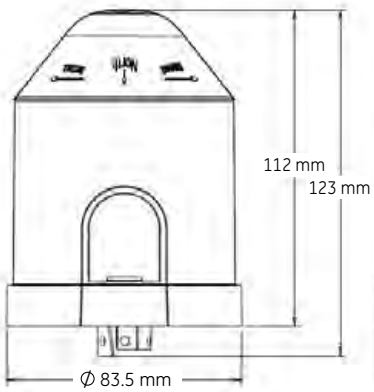
Product Features

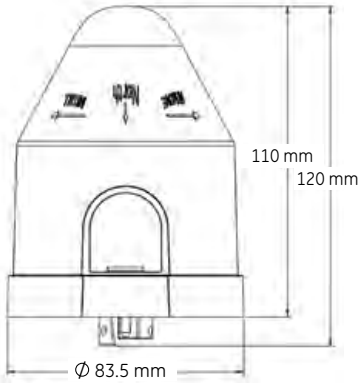
- Utility Grade Measurement up to 0.5% Accuracy
- Self-forming & self-restoring mesh network
- Static IPV6 data addressing and routing
- Reliable and Secure Encrypted Communications
- Nodes, gateway can be spaced up to 500m apart (Clear Line of Sight)
- Utility grade 15 minute time of use Energy consumption 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

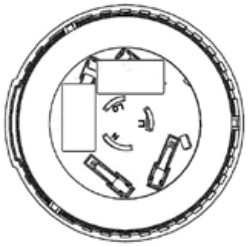
Product Specifications

- 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







ANSI Dimming

GE Dimming

Ordering Number Logic

E L W N _ _ _ _ _ 5 _ _ G _ 5 _ _ _

PRODUCT ID	VOLTAGE	PIN CONFIGURATION	PINS	METERING	GPS	MAX WATTAGE	NETWORK CONFIGURATION	COUNTRY/POLE
E L W N	**0** = 120/277 **5** = 480	**D** = GE Dimming **A** = ANSI Dimming	**5** = 5 Pin	**R** = 2% Revenue Grade **U** = 0.5% Utility Grade	**G** = GPS Capability	**5** = 450 Watts	**S** = Stand Alone **B** = Network B **None** = Default	**None** = Default (US)

www.gelighting.com

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CTRL001 (Rev 06/10/15)

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)

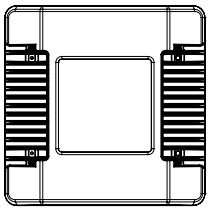
Limited Warranty†: 10 years on luminaire / 10 years on Colorfast DeltaGuard® finish

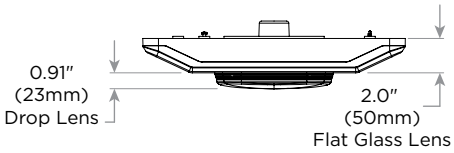
Accessories

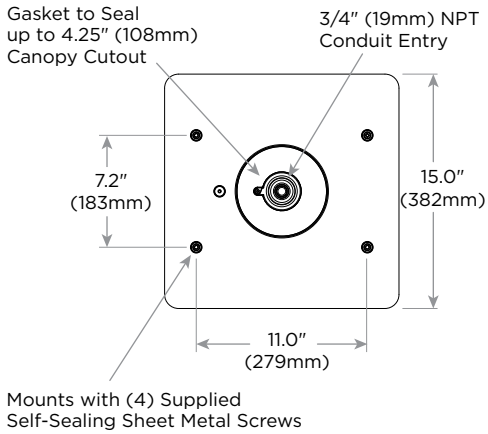
Field Installed Accessories	
XA-BXCCMW Upgrade Kit for use with Jet-Phillips canopy luminaires	**XA-BXCCJBOX** Junction Box / Stem Kit - 6.0″ (152mm) H x 3/4″ (19mm) NPT Stem
XA-BXCCNW Upgrade Kit for use with Elsco Franciscan canopy luminaires	**XA-BXCCBPW** Beauty Plate
XA-BXCCPW Upgrade Kit for use with LSI Dakota or Masters canopy luminaires	**XA-BXCCBPB12W** Beauty Plate w/ 12″ (305mm) Backer
XA-BXCCQW Upgrade Kit for use with Whiteway Riviera or Rig-A-Lite canopy luminaires	**XA-BXCCBPB16W** Beauty Plate w/ 16″ (406mm) Backer
XA-BXCCRW Upgrade Kit for use with Elsco Merrit canopy luminaires	**TPS-2** Tamper Resistant Driver Bit
XA-BXCCSW Upgrade Kit for use with LSI Richmond or Whiteway Civic canopy luminaires	**XA-SENSREM** Hand-Held Remote - For successful implementation of the programmable multi-level option, a minimum of one hand-held remote is required

Drop Lens

Flat Lens







Ordering Information

Example: CPY250-A-DM-D-B-UL-WH-OPTIONS

QUICKSHIP™

Click below to select Quick Ship products

For full list of Cree Quick Ship products visit **www.cree.com/lighting/quickship**

CPY250	A	DM		B			
Product	**Version**	**Mounting**	**Optic**	**Input Power Designator**	**Voltage**	**Color Options**	**Options**
CPY250	**A**	**DM** Direct	**D** 0.91″ (23mm)Drop **Lens** **F** Flat Lens	**B** 122W	**UL** Universal 120–277V **UH** Universal 347–480V*	**WH** White (Standard) **SV** Silver **BK** Black **BZ** Bronze **PB** Platinum Bronze	**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 input power **ML Multi-Level (100% / 30% Power)** - Refer to ML spec sheet for details **PML Programmable Multi-Level** - Refer to PML spec sheet for details

† 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.

Rev. Date: 01/23/14

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 (4 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

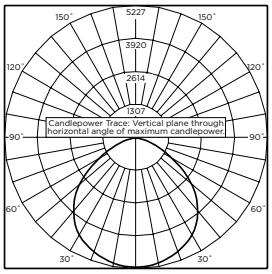
- **Input Voltage:** 120–277V or 347–480V, 50 / 60Hz, Class 1 drivers
- **Power Factor:** > 0.9 at full load
- **Total Harmonic Distortion:** < 20% at full load
- Integral 6kV surge suppression protection standard
- To address inrush current, slow blow fuse or type C / D breaker should be used

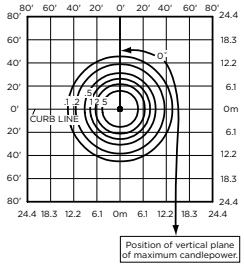
REGULATORY & VOLUNTARY QUALIFICATIONS

- 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

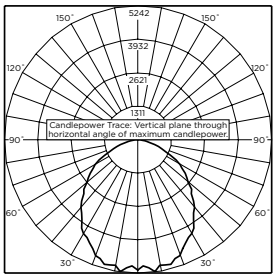
All published luminaire photometric testing performed to IESNA LM-79-08 standards by a NVLAP certified laboratory.

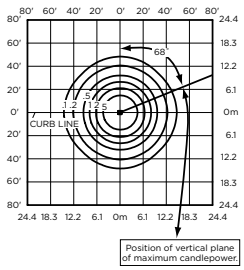




ITL Test Report #: 76865
CPY250-A-**-F-B-UL
Initial Delivered Lumens: 13,636

CPY250-A-**-F-B-UL
Mounting Height: 15′ (4.6m)
Initial Delivered Lumens: 13,000
Initial FC at grade





CESTL Test Report #: 2013-0112
CPY250-A-**-D-B-UL
Initial Delivered Lumens: 13,242

CPY250-A-**-D-B-UL
Mounting Height: 15′ (4.6m)
Initial Delivered Lumens: 13,000
Initial FC at grade

Weight

Weight
12.5 lbs (5.7kg)

Lumen Output, Electrical, and Lumen Maintenance Data

CPY250 Canopy Luminaire													
Optic	5700K		4000K		System Watts 120–277V	System Watts 347–480V	TOTAL CURRENT						50K Hours Projected Lumen Maintenance Factor @ 15˚C (59˚F)***
	Initial Delivered Lumens*	BUG Ratings** Per TM-15-11	Initial Delivered Lumens*	BUG Ratings** Per TM-15-11			120V	208V	240V	277V	347V	480V	
D	13,000	B3 U2 G2	12,400	B3 U2 G2	122	137	1.04	0.60	0.52	0.46	0.40	0.29	94%
F	13,000	B3 U0 G1	12,400	B3 U0 G1	122	137	1.04	0.60	0.52	0.46	0.40	0.29	94%

* 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/Erratas/TM-15-11BugRatingsAddendum.pdf.
*** For recommended lumen maintenance factor data see TD-13. Calculated L_{70} based on 6,000 hours LM-80-08 testing: > 100,000 hours.

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CR14-22L-40K-10V

CR Series

CR14™ 1' x 4' Architectural LED Troffer

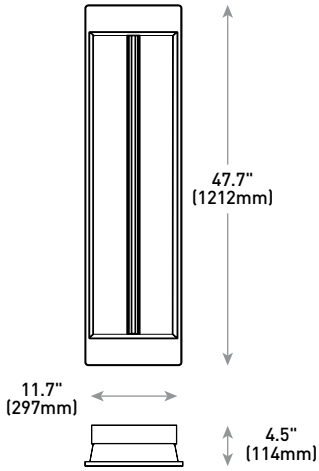
Product Description

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

- Utilizes Cree TrueWhite® Technology (90 CRI)
- Room-Side Heat Sink
- **Efficacy:** 90-130 LPW
- **Initial Delivered Lumens:** 2,200, 3,100, 4,000, 5,000 lumens
- **Input Power:** 22-50 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
- **Limited Warranty Emergency Back Up (EB) Battery:** 1 Year Battery Back Up. Test regularly in accordance with local codes
- **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 , Lutron EcoSystem Enabled to 5%*
- **Mounting:** Recessed**

† See www.cree.com/canada for warranty terms
* Reference www.cree.com/lighting for recommended dimming control options
** Acceptable for use with standard 9/16 T-Bar or larger when installed per installation instructions. Consult factory for non-standard grid applications



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"

Accessories

Field-Installed		
Adjustable Cable AC5- 72 PD8 JB AC5 18/4 72 PD8 JB **Chicago Plenum Field Kit** CPLCR	**Chicago Plenum Field Kit-Emergency** CPLCR 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 SD **Surface Mount Kit** SMK 14

Ordering Information

Example: CR14-40L-35K-S

CR14					
Product	**Initial Delivered Lumens**	**CCT**	**Voltage**	**Control**	**Options**
CR14	**22L**[1] 22W, 2200 lumens – 100 LPW - Only available in 35K or 40K **31L**[1] 34W 3100 lumens – 90 LPW **40L** 40W 4000 lumens – 100 LPW **40LHE**[1] 30.5W 4000 lumens – 130 LPW (30K) 32W 4000 lumens – 125 LPW (35K) 33W 4000 lumens – 120 LPW (40K) 34.5W 4000 lumens – 115 LPW (50K) **50L**[2] 50W 5000 lumens – 100 LPW	**30K** 3000K **35K** 3500K **40K** 4000K **50K** 5000K	**Blank** 120-277 Volt **34V** 347 Volt - Integrated option available on 40L only. Other types require addition of a 347 accessory kit (see table above)	**S** Step Dimming to 50% **10V** 0-10V Dimming to 5% **LES**[3] Lutron EcoSystem® Enabled to 5%	**HD** **CRI 80+ (44W 4000 lumens – 90 LPW)** - Available only with 40L **EB14**[4,5] **Emergency Backup – 1400 lumens** - Not for use with SMK Kits. Use EB14 SMK **EB14SMK**[4,5] **Emergency Backup with surface mount kit – 1400 lumens** - Includes surface mount kit accessory (SMK-CR14)

1. Not available with HD 2. Not available with HD, EB14, EB14SMK 3. Not available in the following options: 22L: 30K or 50K; 31L: All Colors; 40LHE: 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

Rev. Date: V5B 12/22/2016

US: www.cree.com T (800) 236-6800 F (262) 504-5415
Canada: www.cree.com/canada T (800) 473-1234 F (800) 890-7507

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 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 view of LEDs while lower reflector 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%*
- Continuous dimming to 5% with 0-10V DC control protocol*
- Lutron EcoSystem® Enabled option allows seamless integration with Lutron EcoSystem controls
- Reference www.creelink.com/exLink.asp?7098214OZ58R34I26620963 for recommended dimming controls and wiring diagrams

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

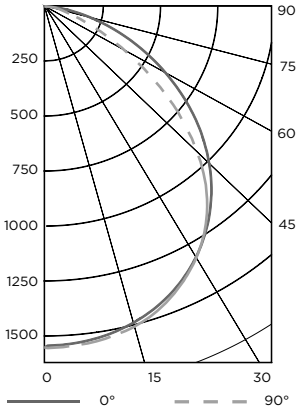
Recommended CR Series Lumen Maintenance Factors (LMF)[1]

Ambient	Initial Delivered Lumens	Initial LMF	25K hr Projected[2] LMF	50K hr Projected[2] LMF	75K hr Calculated[3] LMF	100K hr Calculated[3] LMF
0˚C (41˚F)	22L, 31L, 40L, and 50L	1.05	1.04	1.04	1.04	1.04
	40LHE	1.05	1.01	0.98	0.96	0.94
5˚C (41˚F)	22L, 31L, 40L, and 50L	1.04	1.03	1.03	1.03	1.03
	40LHE	1.04	1.00	0.97	0.95	0.93
10˚C (50˚F)	22L, 31L, 40L, and 50L	1.03	1.02	1.02	1.02	1.02
	40LHE	1.03	0.99	0.96	0.94	0.92
15˚C (59˚F)	22L, 31L, 40L, and 50L	1.02	1.01	1.01	1.01	1.01
	40LHE	1.02	0.98	0.95	0.93	0.91
20˚C (68˚F)	22L, 31L, 40L, and 50L	1.01	1.00	1.00	1.00	1.00
	40LHE	1.01	0.97	0.95	0.92	0.90
25˚C (77˚F)	22L, 31L, 40L, and 50L	1.00	0.99	0.99	0.99	0.99
	40LHE	1.00	0.96	0.94	0.91	0.89
30˚C (86˚F)	22L, 31L, 40L, and 50L	0.99	0.98	0.98	0.98	0.98
	40LHE	0.99	0.95	0.93	0.91	0.89
35˚C (95˚F)	22L, 31L, 40L, and 50L	0.98	0.97	0.97	0.97	0.97
	40LHE	0.98	0.94	0.92	0.90	0.88
40˚C (104˚F)	22L, 31L, 40L, and 50L	0.97	0.96	0.96	0.96	0.96
	40LHE	0.97	0.93	0.91	0.89	0.87

[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 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%.



Coefficients Of Utilization – Zonal Cavity Method				
RC %:	80			
RW %:	70	50	30	10
RCR: 0	119	119	119	119
1	110	106	102	73
2	101	93	87	82
3	92	82	75	69
4	85	74	65	59
5	78	66	57	51
6	72	60	51	45
7	67	54	46	40
8	63	49	41	36
9	58	45	37	32
10	55	42	34	29

Effective Floor Cavity Reflectance: 20%

Reference http://creecanada.com/products/interior/troffers/cr-series/ for detailed photometric data

Average Luminance Table (cd/m²)				
	Horizontal Angle			
Vertical Angle		0°	45°	90°
	45°	5,407	5,407	5,407
	55°	5,015	5,002	4,673
	65°	4,589	4,315	3,572
	75°	3,039	1,690	1,282
	85°	1,727	1,249	1,321

Zonal Lumen Summary			
Zone	Lumens	% Lamp	Luminaire
0-30	1,220	N/A	30.8%
0-40	1,995	N/A	50.4%
0-60	3,385	N/A	85.5%
0-90	3,959	N/A	100%
0-180	3,959	N/A	100%

Application Reference

Based on CR14-40L-30K Luminaire

Open Space						
Spacing	Initial Delivered Lumens	Lumens	Wattage	LPW	w/ft²	Average fc
8 x 8	22L	2200	22	100	0.35	30
	40L	4000	40	100	0.69	54
	40LHE	4000	30.5	125	0.56	54
	50L	5000	50	100	0.78	68
8 x 10	22L	2200	22	100	0.28	25
	40L	4000	40	100	0.55	45
	40LHE	4000	30.5	125	0.45	45
	50L	5000	50	100	0.62	57
10 x 10	22L	2200	22	100	0.22	21
	40L	4000	40	100	0.44	38
	40LHE	4000	30.5	125	0.36	38
	50L	5000	50	100	0.50	48
10 x 12	22L	2200	22	100	0.19	17
	40L	4000	40	100	0.37	30
	40LHE	4000	30.5	125	0.30	30
	50L	5000	50	100	0.42	38

9' ceiling: 80/50/20 reflectances; 2.5' workplane, open room. LLF: 1.0 Initial Open Space: 50' x 40' x 10'

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CR Series

CR22™ 2' x 2' Architectural LED Troffer

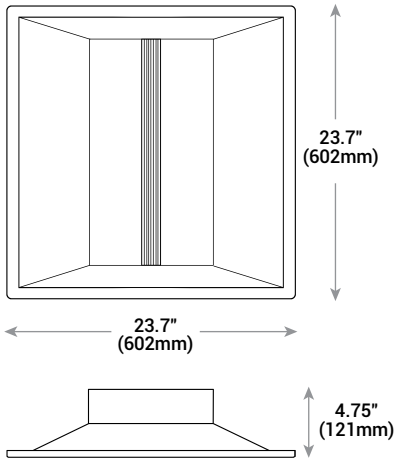
Product Description

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)
- Room-Side Heat Sink
- **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
** Acceptable for use with standard 9/16 T-Bar or larger when installed per installation instructions. Consult factory for non-standard grid applications



NOTE: Use of Expanded Junction Box will expand the depth to 6.67" and Emergency Backup will expand the depth to 6.30". Use of 347V will increase fixture height by 1.4"

Accessories

Field-Installed		
Adjustable Cable AC5 72 PD8 JB AC5 18/4 72 PD8 JB **Chicago Plenum Field Kit** CPLCR **Chicago Plenum Field Kit-Emergency** CPLCR 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 SD **Surface Mount Kit** SMK CR22

Ordering Information

Example: CR22-20L-35K-S

CR22					
Product	**Initial Delivered Lumens**	**CCT**	**Voltage**	**Control**	**Options**
CR22	**20L**[1] 22W 2000 lumens – 90 LPW **32L** 32W 3200 lumens – 100 LPW	**30K** 3000K **35K** 3500K **40K** 4000K **50K** 5000K	**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% **10V** 0-10V Dimming to 5% **LES**[2] Lutron EcoSystem® Enabled to 5%	**HD** **CRI 80+ (44W 4000 lumens - 90 LPW)** - Available only with 40L **EB14**[3] **Emergency Backup - 1400 lumens** - Not for use with SMK Kits . Use EB14 SMK **EB14SMK**[3] **Emergency Backup with surface mount kit - 1400 lumens** - Includes surface mount kit accessory (SMK-CR22)

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.

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 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 view of LEDs while lower reflector 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

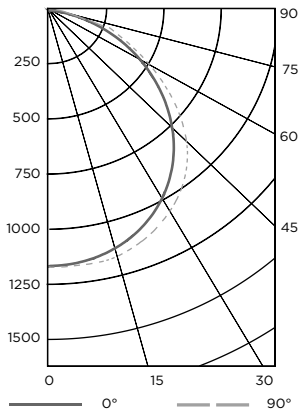
Recommended CR Series Lumen Maintenance Factors (LMF)[1]

Ambient	Initial Delivered Lumens	Initial LMF	25K hr Projected[2] LMF	50K hr Projected[2] LMF	75K hr Calculated[3] LMF	100K hr Calculated[3] LMF
0˚C (41˚F)	20L and 32L	1.05	1.04	1.04	1.04	1.04
5˚C (41˚F)	20L and 32L	1.04	1.03	1.03	1.03	1.03
10˚C (50˚F)	20L and 32L	1.03	1.02	1.02	1.02	1.02
15˚C (59˚F)	20L and 32L	1.02	1.01	1.01	1.01	1.01
20˚C (68˚F)	20L and 32L	1.01	1.00	1.00	1.00	1.00
25˚C (77˚F)	20L and 32L	1.00	0.99	0.99	0.99	0.99
30˚C (86˚F)	20L and 32L	0.99	0.98	0.98	0.98	0.98
35˚C (95˚F)	20L and 32L	0.98	0.97	0.97	0.97	0.97
40˚C (104˚F)	20L and 32L	0.97	0.96	0.96	0.96	0.96

[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 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

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%..



Coefficients Of Utilization – Zonal Cavity Method				
RC %:	80			
RW %:	70	50	30	10
RCR: 0	119	119	119	119
1	110	105	101	98
2	100	92	85	80
3	91	81	73	67
4	84	72	63	57
5	77	64	55	49
6	71	58	49	43
7	66	52	44	38
8	61	48	39	33
9	57	44	36	30
10	53	40	32	27

Effective Floor Cavity Reflectance: 20%

Reference www.cree.com/Lighting/Products/Indoor/Troffers/CR-Series for detailed photometric data

Average Luminance Table (cd/m²)				
	Horizontal Angle			
Vertical Angle		0°	45°	90°
	45°	3,575	3,864	3,972
	55°	3,164	3,656	3,758
	65°	2,498	3,133	3,347
	75°	1,620	2,348	2,051
	85°	366	252	168

Zonal Lumen Summary			
Zone	Lumens	% Lamp	Luminaire
0-30	923	N/A	28.1%
0-40	1,527	N/A	46.5%
0-60	2,704	N/A	82.5%
0-90	3,280	N/A	100%
0-180	3,959	N/A	100%

Application Reference

Based on CR22-32L-30K Luminaire

Open Space					
Spacing	Lumens	Wattage	LPW	w/ft²	Average fc
8 x 8	2000L	22W	90	0.35	28
	3200L	32W	100	0.55	44
8 x 10	2000L	22W	90	0.28	23
	3200L	32W	100	0.44	37
10 x 10	2000L	22W	190	0.22	20
	3200L	32W	100	0.35	31
10 x 12	2000L	22W	90	0.19	16
	3200L	32W	100	0.29	25

9' ceiling: 80/50/20 reflectances; 2.5' workplane, open room. LLF: 1.0 Initial Open Space: 50' x 40' x 10'

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DSX0 LED 20C 530 40K T3M MVOLT

D-Series LED, Size 0

Area Luminaire

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

DSX0			
Model	Input Watts	Lumens	Metal Halide Replacement
DSX0 LED P1 40K T3M	38W	4,577	175W
DSX0 LED P3 40K T3M	71W	8,205	250W
DSX0 LED P5 40K T3M	89W	11,346	400W
DSX0 LED P7 40K T3M	166W	17,832	620W

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 ft^2

D-Series LED Area Luminaire, Size 0

Ordering Information

EXAMPLE: DSX0 LED P6 40K T3M MVOLT SPA DDBXD

DSX0 LED

Series	LEDs	Color temperature	Distribution	Voltage	Mounting
DSX0 LED	**Forward optics** P1 P4 P7 P2 P5 P3 P6 **Rotated optics** P10 P12 P11 P13	30K 3000 K 40K 4000 K 50K 5000 K AMBPC Amber phosphor converted	T1S Type I short T2S Type II short T2M Type II medium T3S Type III short T3M Type III medium T4M Type IV medium TFTM Forward throw medium T5VS Type V very short T5S Type V short T5M Type V medium T5W Type V wide BLC Backlight control LCCO Left corner cutoff RCCO Right corner cutoff	MVOLT 120 208 240 277 347 480	**Shipped included** SPA Square pole mounting RPA Round pole mounting WBA Wall bracket SPUMBA Square pole universal mounting adaptor RPUMBA Round pole universal mounting adaptor **Shipped separately** KMA8 DDBXD U Mast arm mounting bracket adaptor (specify finish)

Control options				Other options	Finish *(required)*
Shipped installed		BL30 Bi-level switched dimming, 30%		**Shipped installed**	DDBXD Dark bronze
PER NEMA twist-lock receptacle only (control ordered separate)		BL50 Bi-level switched dimming, 50%		HS House-side shield	DBLXD Black
PER5 Five-wire receptacle only (control ordered separate)		PNMTDD3 Part night, dim till dawn		SF Single fuse (120, 277, 347V)	DNAXD Natural aluminum
PER7 Seven-wire receptacle only (control ordered separate)		PNMT5D3 Part night, dim 5 hrs		DF Double fuse (208, 240, 480V)	DWHXD White
DMG 0-10V dimming extend out back of honsing for external control (no controls) (leads exit fixture)		PNMT6D3 Part night, dim 6 hrs		L90 Left rotated optics	DDBTXD Textured dark bronze
PIR Bi-level, motion/ambient sensor, 8-15' mounting height, ambient sensor enabled at 5fc		PNMT7D3 Part night, dim 7 hrs		R90 Right rotated optics	DBLBXD Textured black
PIRH Bi-level, motion/ambient sensor, 15-30' mounting height, ambient sensor enabled at 5fc		FAO Field adjustable output		DDL Diffused drop lens	DNATXD Textured natural aluminum
PIR1FC3V Bi-level, motion/ambient sensor, 8-15' mounting height, ambient sensor enabled at 1fc				BS Bird spikes	DWHGXD Textured white
PIRH1FC3V Bi-level, motion/ambient sensor, 15-30' mounting height, ambient sensor enabled at 1fc					

Accessories *Ordered and shipped separately.*

Controls & Shields

DLL127F 1.5 JU	Photocell - SSL twist-lock (120-277V)
DLL347F 1.5 CUL JU	Photocell - SSL twist-lock (347V)
DLL480F 1.5 CUL JU	Photocell - SSL twist-lock (480V)
DSHORT SBK U	Shorting cap
DSX0HS 20C U	House-side shield for 20 LED unit
DSX0HS 30C U	House-side shield for 30 LED unit
DSX0HS 40C U	House-side shield for 40 LED unit
DSX0DDL U	Diffused drop lens (polycarbonate)
PUMBA DDBXD U	Square and round pole universal mounting bracket adaptor (specify finish)
KMA8 DDBXD U	Mast arm mounting bracket adaptor (specify finish)

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

lighting facts LED Product Partner

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.

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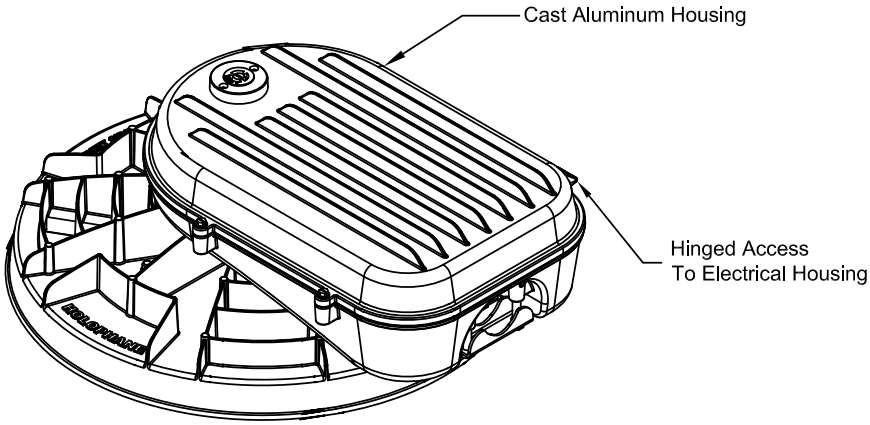
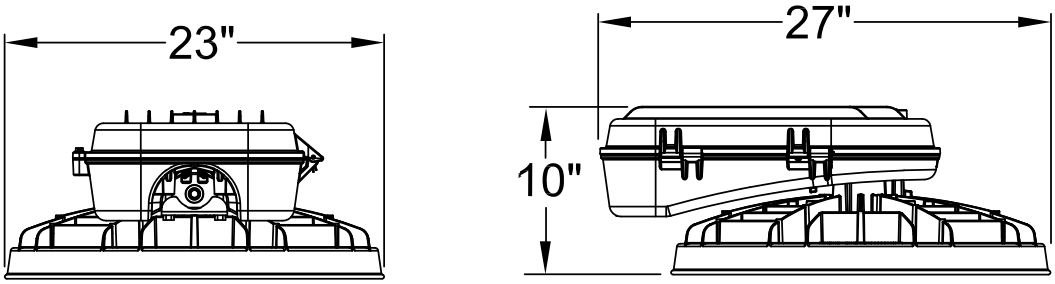
AcuityBrands.

Weight = 52lbs
EPA =1.30 sq. ft
UL1598, 40C, Wet location

HMLED2 06 4K AH G F P7 RFD211068





HMLED2™ LED High Mast Lighting

Infrastructure Specialty

HOLOPHANE® LEADER IN LIGHTING SOLUTIONS
An AcuityBrandsCompany

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ORDERING INFORMATION:

HMLED2	6	4K	AH
Series	Number of LED Modules	Color Temperature	Voltage
HMLED2	06 = 06 Modules 09 = 09 Modules 12 = 12 Modules	4K = 4,000K CCT +/-250K 5K = 5,000K CCT +/-250K	AS = Auto-Sensing Voltage (120 - 277 V) AH = Auto-Sensing Voltage (347 - 480 V)

G	F	P7 RFD211069	
Housing Color	Optical	Options	Accessories
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	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 Photocontol 120-277V PCL1 = DTL DLL Photocontrol for 120-277V PCL3 = DTL Twist-off Photocontrol for 347V PCL4 = DTL Twist-off Photocontrol for 480V PSC= Shorting Cap	F1 = Single Fusing Accessory F2 = Double Fusing Accessory HMLED2D90 = 90 Degree Shield HMLED2D120 = 120 Degree Shield HMLED2D180 = 180 Degree Shield

PRODUCT ENGINEERED TO LIMIT INRUSH TO 100A PER CUSTOMERS SPEC

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ORDER #:
TYPE:
DRAWN: ERM
DATE: 8/1/14
DWG #: LUM_HMLED2

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/IEEEC62.41. 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 photocontrol receptacles. The P5 and P7 receptacle options are factory pre-wired to dimming leads of drivers.

PCSS - Premium solid state locking style photocontrol (10 year rated life)

PCL1 - Extreme long life solid state locking-style photocontrol (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)

LED Qty	CCT	Lumens	Input Watts	LPW	Input Amps						L83 @ 25C	Driver Life @ 25C
					120V	208V	240V	277V	347V	480V		
6	4000K	31,419	252	125	2.10	1.20	1.00	0.90	0.70	0.50	100,000 hrs	>100,000 hrs
9	4000K	46,675	376	124	3.10	1.80	1.60	1.40	1.10	0.80		
12	4000K	60,990	500	122	4.10	2.40	2.10	1.80	1.40	1.00		

Testing Compliance

See Holophane HMAO-LED Validation Test Specification - Luminaire conforms to following standards: ANSI/IEEE C62.41:2002 - Surge protection. ANSI C82.77:2002 - Harmonic distortion. ANSIC136.31:2001- Luminaire vibration. ASTM B 117:2003 - Salt spray test. FCC title 47 CFR Part 18 - Federal Communications Commission. IEC 60068 - Environmental testing. IEC 60529:1999 - Degrees of protection provided by enclosure (IP)IEC 61000 - Electromagnetic Compatibility testing (EMC). IEEE 519 - Harmonic control in Electrical Power systems. UL-1598, 40C, Wet Location - Safety listing.

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™
LED High Mast Lighting

Infrastructure Specialty

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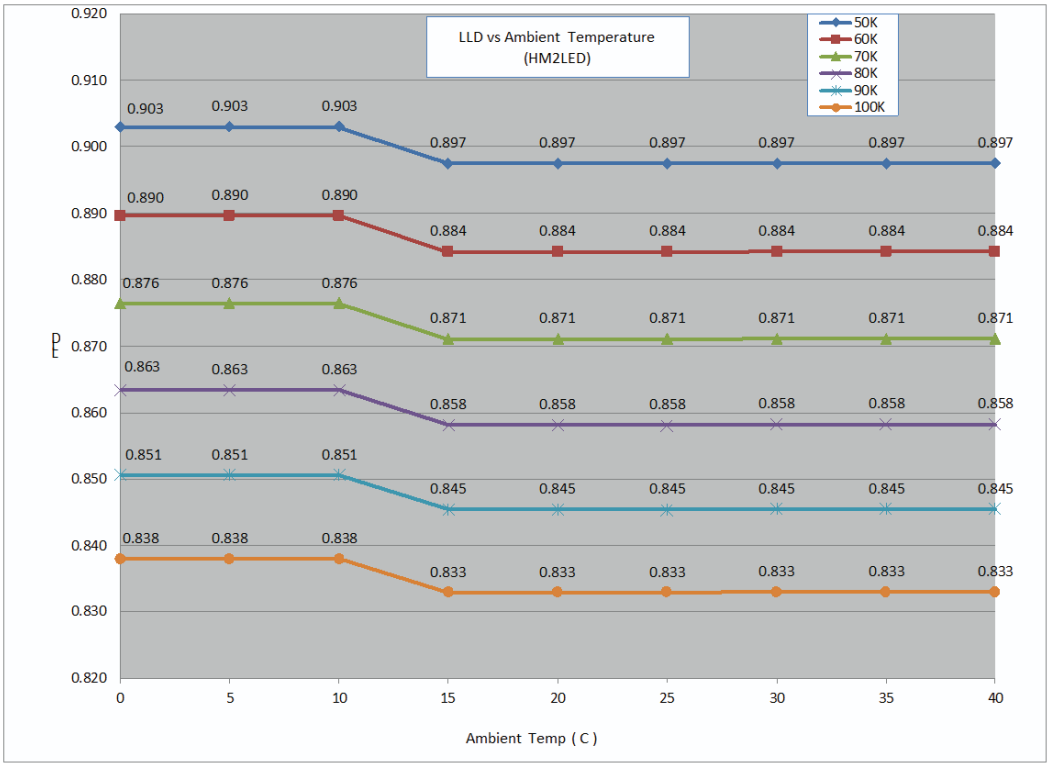
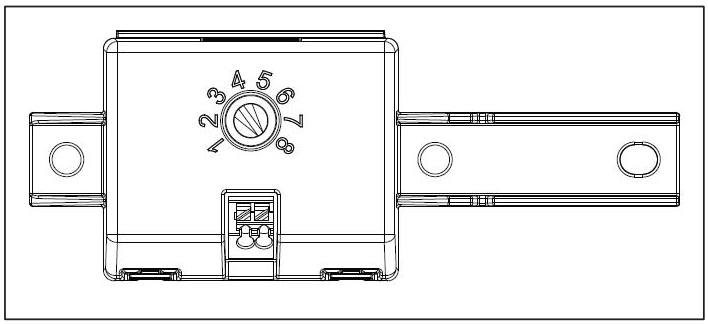
ORDER #:
TYPE:
DRAWN: ERM
DATE: 8/1/14
DWG #: LUM_HMLED2

Lumen Depreciation Chart



The Field Adjustable Output (AO) module



Configuration	AO Position	Lumens %	Wattage %
HMLED2-06,09,12	8	100%	100%
HMLED2-06,09,12	7	100%	100%
HMLED2-06,09,12	6	100%	100%
HMLED2-06,09,12	5	90%	85%
HMLED2-06,09,12	4	80%	73%
HMLED2-06,09,12	3	68%	60%
HMLED2-06,09,12	2	57%	49%
HMLED2-06,09,12	1	41%	34%

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LED High Mast Lighting

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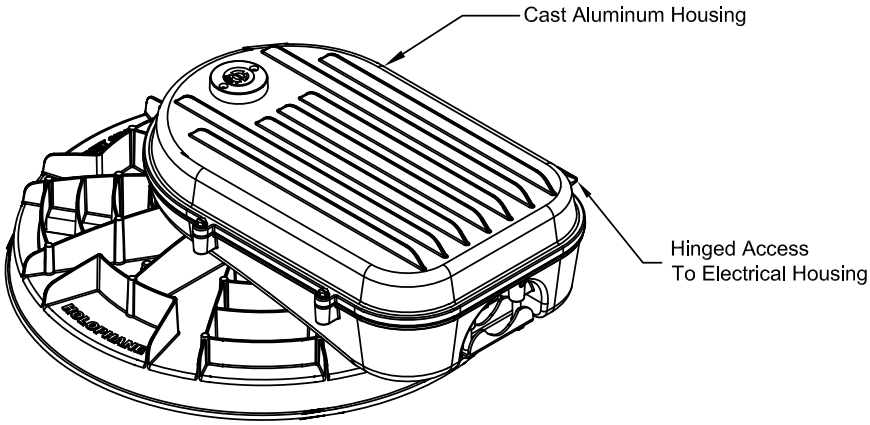
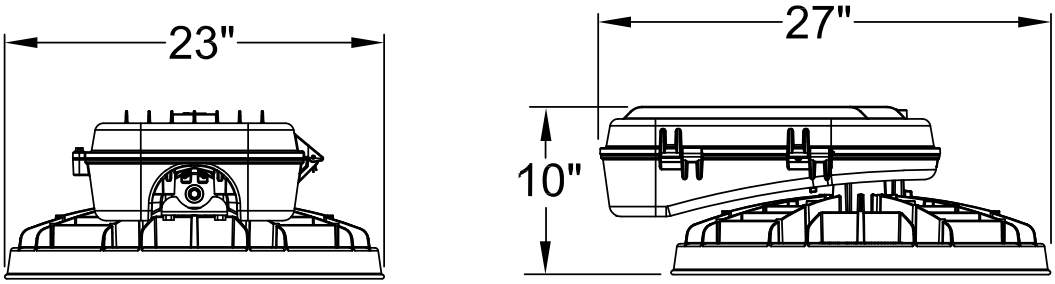
ORDER #:
TYPE:
DRAWN: ERM
DATE: 8/1/14
DWG #: LUM_HMLED2

HMLED2 12 4K AH G F P7 RFD211069

Weight = 52lbs
EPA =1.30 sq. ft
UL1598, 40C, Wet location





HMLED2™ LED High Mast Lighting

Infrastructure Specialty

HOLOPHANE® LEADER IN LIGHTING SOLUTIONS
An AcuityBrandsCompany

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ORDERING INFORMATION:

HMLED2 — Series
- HMLED2

12 — Number of LED Modules
- 06 = 06 Modules
- 09 = 09 Modules
- 12 = 12 Modules

4K — Color Temperature
- 4K = 4,000K CCT +/-250K
- 5K = 5,000K CCT +/-250K

AH — Voltage
- AS = Auto-Sensing Voltage (120 - 277 V)
- AH = Auto-Sensing Voltage (347 - 480 V)

G — Housing Color
- A = As Specified
- G = Gray
- H = Graphite
- K = Black
- Z = Bronze
- W =White

F — Optical
- M = Medium, Asymmetric
- N= Narrow, Asymmetric
- F = Forward Throw, Asymmetric
- AN = Area Narrow
- AW = Area Wide

P7 RFD211068 — Options
- 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 Photocontol 120-277V
- PCL1 = DTL DLL Photocontrol for 120-277V
- PCL3 = DTL Twist-off Photocontrol for 347V
- PCL4 = DTL Twist-off Photocontrol for 480V
- PSC= Shorting Cap

Accessories
- F1 = Single Fusing Accessory
- F2 = Double Fusing Accessory
- HMLED2D90 = 90 Degree Shield
- HMLED2D120 = 120 Degree Shield
- HMLED2D180 = 180 Degree Shield

PRODUCT ENGINEERED TO LIMIT INRUSH TO 100A PER CUSTOMERS SPEC

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ORDER #:	
TYPE:	
DRAWN:	ERM
DATE:	8/1/14
DWG #:	LUM_HMLED2

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/IEEEC62.41. 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 photocontrol receptacles. The P5 and P7 receptacle options are factory pre-wired to dimming leads of drivers.

PCSS - Premium solid state locking style photocontrol (10 year rated life)

PCL1 - Extreme long life solid state locking-style photocontrol (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)

LED Qty	CCT	Lumens	Input Watts	LPW	Input Amps						L83 @ 25C	Driver Life @ 25C
					120V	208V	240V	277V	347V	480V		
6	4000K	31,419	252	125	2.10	1.20	1.00	0.90	0.70	0.50	100,000 hrs	>100,000 hrs
9	4000K	46,675	376	124	3.10	1.80	1.60	1.40	1.10	0.80		
12	4000K	60,990	500	122	4.10	2.40	2.10	1.80	1.40	1.00		

Testing Compliance

See Holophane HMAO-LED Validation Test Specification - Luminaire conforms to following standards: ANSI/IEEE C62.41:2002 - Surge protection. ANSI C82.77:2002 - Harmonic distortion. ANSIC136.31:2001- Luminaire vibration. ASTM B 117:2003 - Salt spray test. FCC title 47 CFR Part 18 - Federal Communications Commission. IEC 60068 - Environmental testing. IEC 60529:1999 - Degrees of protection provided by enclosure (IP)IEC 61000 - Electromagnetic Compatibility testing (EMC). IEEE 519 - Harmonic control in Electrical Power systems. UL-1598, 40C, Wet Location - Safety listing.

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™
LED High Mast Lighting

Infrastructure Specialty

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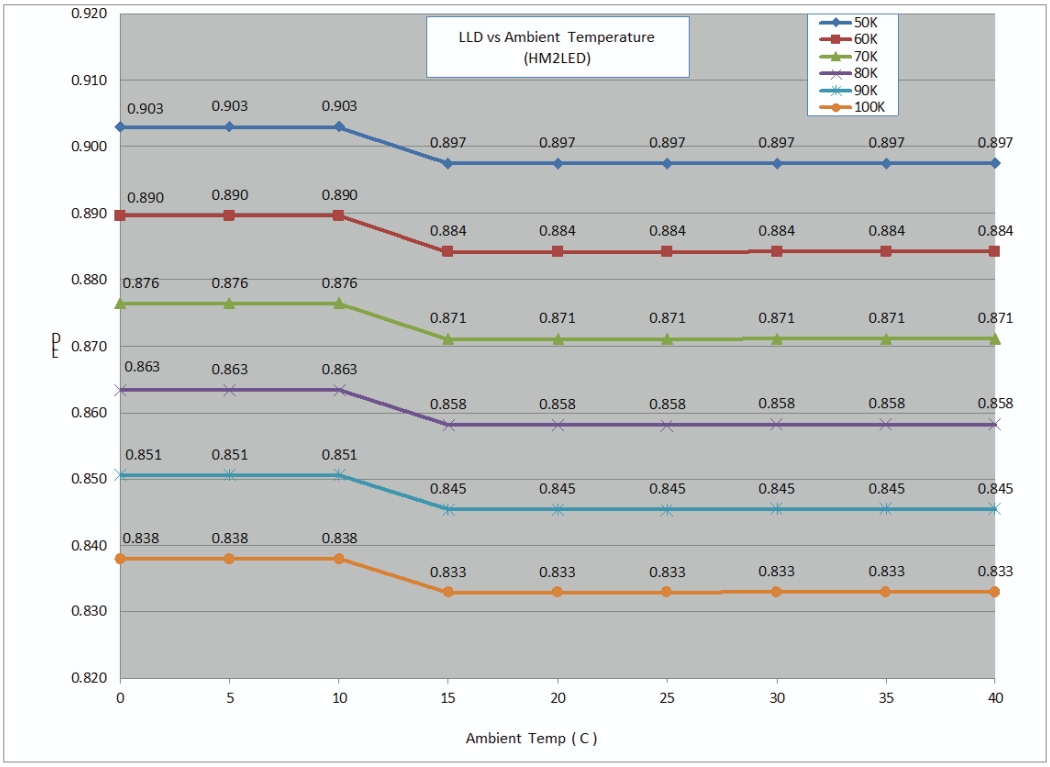
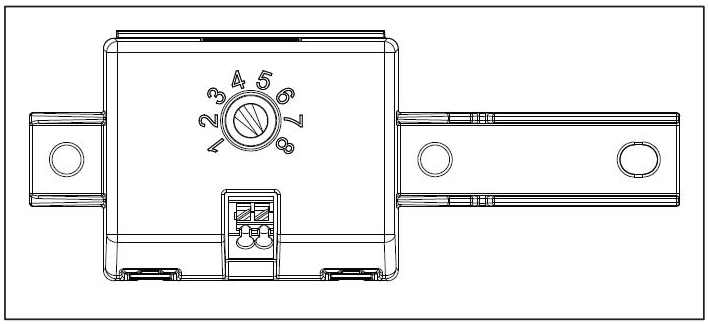
ORDER #:
TYPE:
DRAWN: ERM
DATE: 8/1/14
DWG #: LUM_HMLED2

Lumen Depreciation Chart



The Field Adjustable Output (AO) module



Configuration	AO Position	Lumens %	Wattage %
HMLED2-06,09,12	8	100%	100%
HMLED2-06,09,12	7	100%	100%
HMLED2-06,09,12	6	100%	100%
HMLED2-06,09,12	5	90%	85%
HMLED2-06,09,12	4	80%	73%
HMLED2-06,09,12	3	68%	60%
HMLED2-06,09,12	2	57%	49%
HMLED2-06,09,12	1	41%	34%

HMLED2™
LED High Mast Lighting

Infrastructure Specialty

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ORDER #:
TYPE:
DRAWN: ERM
DATE: 8/1/14
DWG #: LUM_HMLED2

PRECISION PARAGON
EFFICIENCY, ECONOMY, SUSTAINABILITY.

LLW

LED Low Profile Wrap

Product Information

Project Name	Type
Catalog Number	Date

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

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)

CERTIFICATION

C US

ORDERING INFORMATION

EXAMPLE **LLW4-35ML-EU**

LLW – – **U** –

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
ESD Bi-Level[1]
ED 0-10V Dimming[2]

DRIVER VOLTAGE

U Universal 120/277 VAC

OPTIONS

ELL14 Emergency Battery Backup[3]

MOUNTING ACCESSORIES (ORDER SEPARATELY)

S18 18" Stem

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.

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PHOTOMETRIC DATA

PHOTOMETRIC DATA: LLW2-40LW-EU

All published luminaire photometric testing performed to IESNA LM-79-08 standards by a NVLAP certified lab.

Test: ITL79146
Test Date: 09/23/13

LUMINAIRE 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**
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**

AVG. LUMINANCE (Candela/Sq. M.)

Average Luminance Angle	0.0	22.5	45.0	67.5	90.0
0	8727	8727	8727	8727	8727
30	7785	7381	6945	6543	6414
40	6827	6305	5641	5062	4932
45	6037	5534	4834	4361	4250
50	5099	4616	4006	3722	3690
55	4170	3685	3239	3202	3198
60	3397	2930	2587	2794	2786
65	2656	2434	2174	2505	2440
70	2077	2161	1989	2325	2234
75	1754	1963	1939	2227	2138
80	1595	1837	1930	2213	2170
85	1284	1639	1877	2188	2242

ZONAL LUMEN SUMMARY

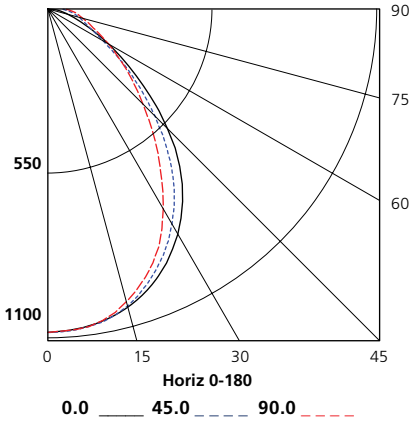
Zone	Lumens	%Lamp	%Fixt
0-30	808	33	33
0-40	1262	51	51
0-60	1931	79	79
0-90	2289	93	93

COEFFICIENTS OF UTILIZATION (%)

RCR	RC	80				70				50			0
	RW	70	50	30	10	70	50	30	10	50	30	10	0
	0	117	117	117	117	114	114	114	114	107	107	107	93
	1	109	103	99	96	104	100	97	94	95	92	89	79
	2	99	92	85	80	96	89	83	79	85	80	76	68
	3	91	82	74	68	88	80	73	67	76	70	65	59
	4	84	73	65	59	81	71	64	58	68	62	57	52
	5	78	66	58	52	75	65	57	51	62	55	50	46
	6	72	60	52	46	70	59	51	45	56	50	44	41
	7	67	55	47	41	65	54	46	41	52	45	40	36
	8	63	50	42	37	61	49	42	37	48	41	36	33
	9	59	46	39	34	57	46	38	33	44	37	33	30
	10	56	43	36	31	54	42	35	30	41	34	30	27

RCR = Room Cavity Ratio **RC** = Effective Ceiling Cavity Reflectance **RW** = Wall Reflectance

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.

Test: ITL79148
Test Date: 09/23/13

LUMINAIRE 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**
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**

AVG. LUMINANCE (Candela/Sq. M.)

Average Luminance Angle	0.0	22.5	45.0	67.5	90.0
0	8335	8335	8335	8335	8335
30	7587	7112	6697	6348	6203
40	6714	6148	5583	5031	4812
45	5897	5411	4827	4295	4098
50	4870	4480	3949	3635	3481
55	3924	3563	3148	3090	3011
60	3181	2858	2486	2669	2625
65	2392	2434	2079	2390	2283
70	1825	2204	1941	2223	2079
75	1678	2071	1921	2144	2002
80	1721	2011	1934	2147	2016
85	1616	1860	1943	2145	2086

ZONAL LUMEN SUMMARY

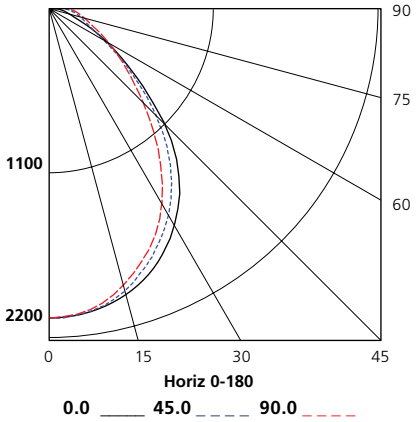
Zone	Lumens	%Lamp	%Fixt
0-30	1538	33	33
0-40	2414	51	51
0-60	3690	79	79
0-90	4359	93	93

COEFFICIENTS OF UTILIZATION (%)

RCR	RC	80				70				50			0
	RW	70	50	30	10	70	50	30	10	50	30	10	0
	0	117	117	117	117	114	114	114	114	107	107	107	93
	1	109	103	99	96	104	100	97	94	95	92	89	79
	2	99	92	85	80	96	89	83	79	85	80	76	68
	3	91	82	74	68	88	80	73	67	76	70	65	59
	4	84	73	65	59	81	71	64	58	68	62	57	52
	5	78	66	58	52	75	65	57	51	62	55	50	46
	6	72	60	52	46	70	59	51	45	56	50	44	41
	7	67	55	47	41	65	54	46	41	52	45	40	36
	8	63	50	42	37	61	49	42	37	48	41	36	33
	9	59	46	39	34	57	46	38	33	44	37	33	30
	10	56	43	36	31	54	42	35	30	41	34	30	27

RCR = Room Cavity Ratio **RC** = Effective Ceiling Cavity Reflectance **RW** = Wall Reflectance

INDOOR CANDELA PLOT



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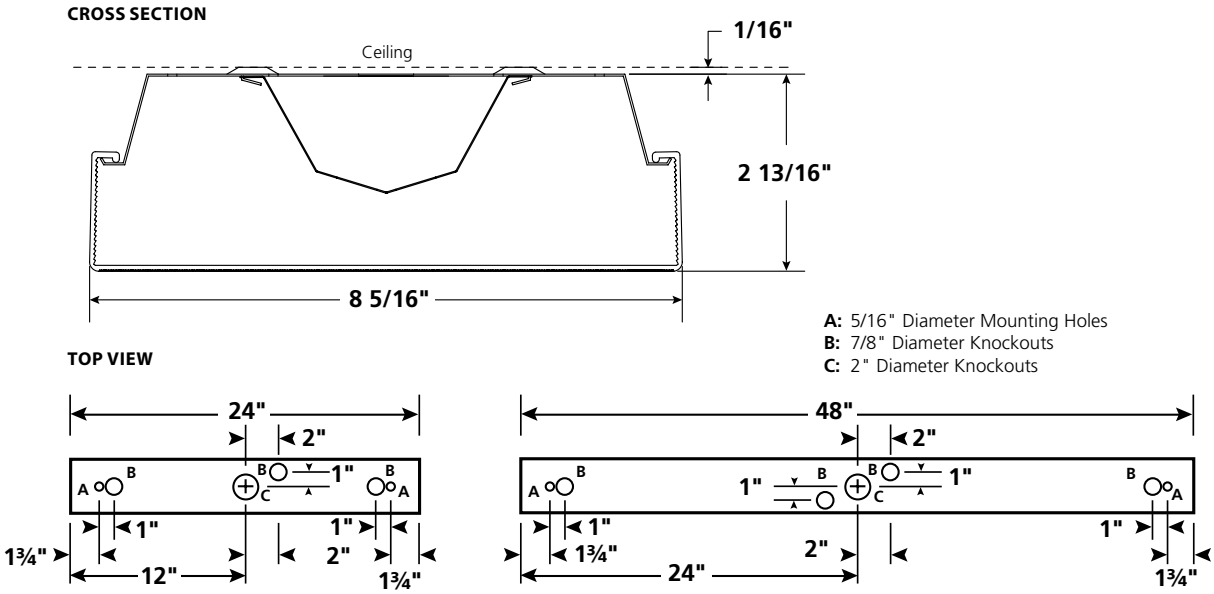
FIXTURE DIMENSIONS



*Drawings N.T.S.

LUMEN PACKAGE OPTIONS

		3500K DETAILS				4000K DETAILS			
Proposed System	CRI	CCT	Lumens Per Fixture	Input Watts	Lumens Per Watt	CCT	Lumens Per Fixture	Input Watts	Lumens Per Watt
LLW2-LW	>80	3500K	2367	25	96	4000K	2453	25	100
LLW2-ML	>80	3500K	4648	51	91	4000K	4739	52	91
LLW4-LW	>80	3500K	2409	25	98	4000K	2459	25	98
LLW4-ML	>80	3500K	4689	52	91	4000K	4873	52	94

*Lumen values shown are initial delivered lumens tested at 25°C per IES LM-79 standards.

OPERATING ENVIRONMENT

Proposed System	Min Temp	Max Temp
LLW-2-LW	-30°C/-22°F	40°C/104°F
LLW-2-ML	-30°C/-22°F	40°C/104°F
LLW-4-LW	-30°C/-22°F	40°C/104°F
LLW-4-ML	-30°C/-22°F	40°C/104°F

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.

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PRECISION PARAGON
EFFICIENCY. ECONOMY. SUSTAINABILITY.

LLW

LED Low Profile Wrap

Product Information

Project Name	Type
Catalog Number	Date

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

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)

CERTIFICATION

C SA US DLC

ORDERING INFORMATION

EXAMPLE **LLW4-35ML-EU**

LLW – – **U** –

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
- **ESD** Bi-Level[1]
- **ED** 0-10V Dimming[2]

DRIVER VOLTAGE
- **U** Universal 120/277 VAC

OPTIONS
- **ELL14** Emergency Battery Backup[3]

MOUNTING ACCESSORIES (ORDER SEPARATELY)
- **S18** 18" Stem

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.

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PHOTOMETRIC DATA

PHOTOMETRIC DATA: LLW2-40LW-EU

All published luminaire photometric testing performed to IESNA LM-79-08 standards by a NVLAP certified lab.

Test: ITL79146
Test Date: 09/23/13

LUMINAIRE 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**
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**

AVG. LUMINANCE (Candela/Sq. M.)

Average Luminance Angle	0.0	22.5	45.0	67.5	90.0
0	8727	8727	8727	8727	8727
30	7785	7381	6945	6543	6414
40	6827	6305	5641	5062	4932
45	6037	5534	4834	4361	4250
50	5099	4616	4006	3722	3690
55	4170	3685	3239	3202	3198
60	3397	2930	2587	2794	2786
65	2656	2434	2174	2505	2440
70	2077	2161	1989	2325	2234
75	1754	1963	1939	2227	2138
80	1595	1837	1930	2213	2170
85	1284	1639	1877	2188	2242

ZONAL LUMEN SUMMARY

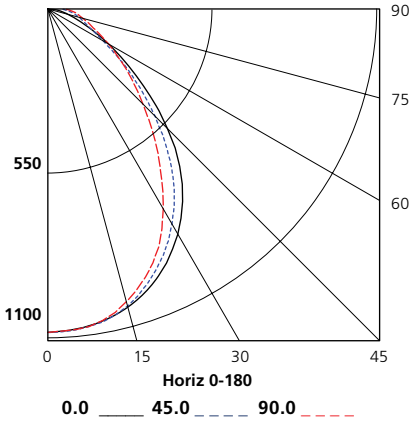
Zone	Lumens	%Lamp	%Fixt
0-30	808	33	33
0-40	1262	51	51
0-60	1931	79	79
0-90	2289	93	93

COEFFICIENTS OF UTILIZATION (%)

RCR	RC	80				70				50			0
	RW	70	50	30	10	70	50	30	10	50	30	10	0
	0	117	117	117	117	114	114	114	114	107	107	107	93
	1	109	103	99	96	104	100	97	94	95	92	89	79
	2	99	92	85	80	96	89	83	79	85	80	76	68
	3	91	82	74	68	88	80	73	67	76	70	65	59
	4	84	73	65	59	81	71	64	58	68	62	57	52
	5	78	66	58	52	75	65	57	51	62	55	50	46
	6	72	60	52	46	70	59	51	45	56	50	44	41
	7	67	55	47	41	65	54	46	41	52	45	40	36
	8	63	50	42	37	61	49	42	37	48	41	36	33
	9	59	46	39	34	57	46	38	33	44	37	33	30
	10	56	43	36	31	54	42	35	30	41	34	30	27

RCR = Room Cavity Ratio **RC** = Effective Ceiling Cavity Reflectance **RW** = Wall Reflectance

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.

Test: ITL79148
Test Date: 09/23/13

LUMINAIRE 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**
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**

AVG. LUMINANCE (Candela/Sq. M.)

Average Luminance Angle	0.0	22.5	45.0	67.5	90.0
0	8335	8335	8335	8335	8335
30	7587	7112	6697	6348	6203
40	6714	6148	5583	5031	4812
45	5897	5411	4827	4295	4098
50	4870	4480	3949	3635	3481
55	3924	3563	3148	3090	3011
60	3181	2858	2486	2669	2625
65	2392	2434	2079	2390	2283
70	1825	2204	1941	2223	2079
75	1678	2071	1921	2144	2002
80	1721	2011	1934	2147	2016
85	1616	1860	1943	2145	2086

ZONAL LUMEN SUMMARY

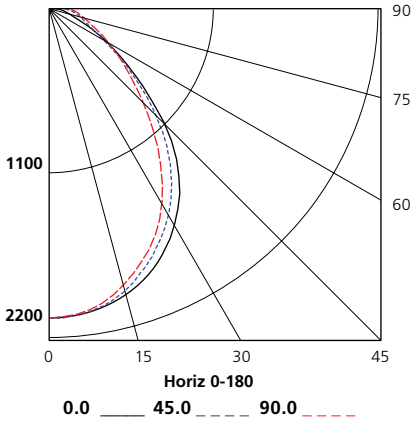
Zone	Lumens	%Lamp	%Fixt
0-30	1538	33	33
0-40	2414	51	51
0-60	3690	79	79
0-90	4359	93	93

COEFFICIENTS OF UTILIZATION (%)

RCR	RC	80				70				50			0
	RW	70	50	30	10	70	50	30	10	50	30	10	0
	0	117	117	117	117	114	114	114	114	107	107	107	93
	1	109	103	99	96	104	100	97	94	95	92	89	79
	2	99	92	85	80	96	89	83	79	85	80	76	68
	3	91	82	74	68	88	80	73	67	76	70	65	59
	4	84	73	65	59	81	71	64	58	68	62	57	52
	5	78	66	58	52	75	65	57	51	62	55	50	46
	6	72	60	52	46	70	59	51	45	56	50	44	41
	7	67	55	47	41	65	54	46	41	52	45	40	36
	8	63	50	42	37	61	49	42	37	48	41	36	33
	9	59	46	39	34	57	46	38	33	44	37	33	30
	10	56	43	36	31	54	42	35	30	41	34	30	27

RCR = Room Cavity Ratio **RC** = Effective Ceiling Cavity Reflectance **RW** = Wall Reflectance

INDOOR CANDELA PLOT



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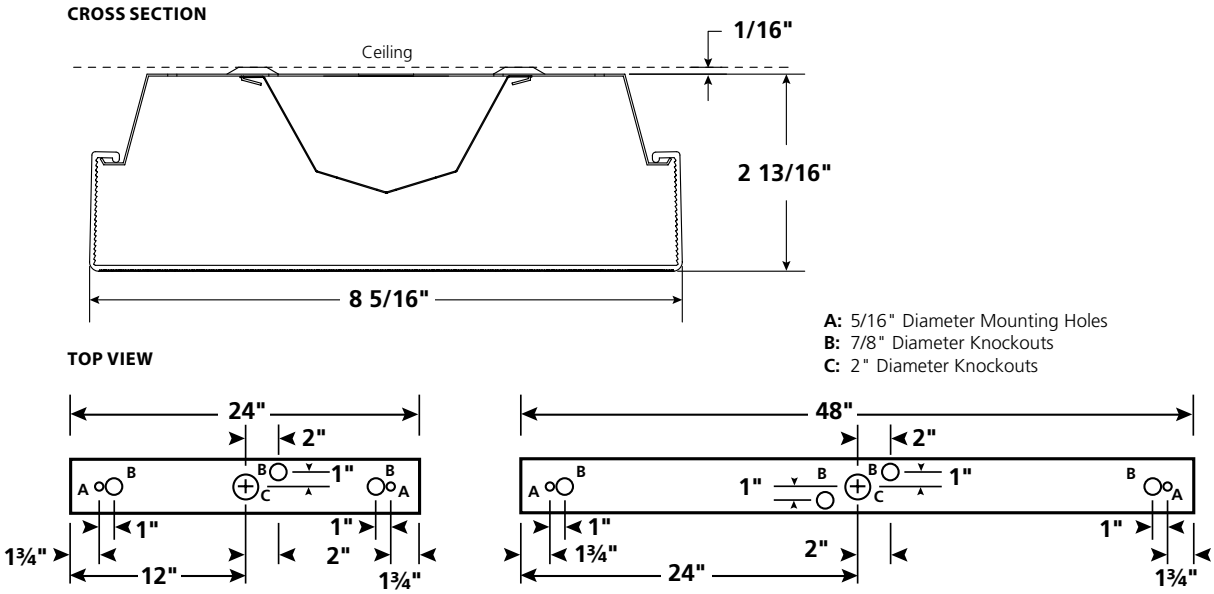
FIXTURE DIMENSIONS



*Drawings N.T.S.

LUMEN PACKAGE OPTIONS

		3500K DETAILS				4000K DETAILS			
Proposed System	CRI	CCT	Lumens Per Fixture	Input Watts	Lumens Per Watt	CCT	Lumens Per Fixture	Input Watts	Lumens Per Watt
LLW2-LW	>80	3500K	2367	25	96	4000K	2453	25	100
LLW2-ML	>80	3500K	4648	51	91	4000K	4739	52	91
LLW4-LW	>80	3500K	2409	25	98	4000K	2459	25	98
LLW4-ML	>80	3500K	4689	52	91	4000K	4873	52	94

*Lumen values shown are initial delivered lumens tested at 25°C per IES LM-79 standards.

OPERATING ENVIRONMENT

Proposed System	Min Temp	Max Temp
LLW-2-LW	-30°C/-22°F	40°C/104°F
LLW-2-ML	-30°C/-22°F	40°C/104°F
LLW-4-LW	-30°C/-22°F	40°C/104°F
LLW-4-ML	-30°C/-22°F	40°C/104°F

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.

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PKG-304-SL-DM

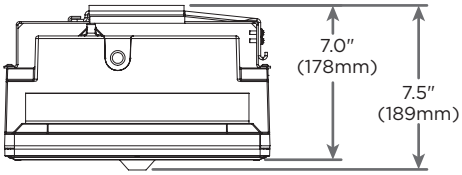
304 Series™ Parking Structure Luminaire – Sparkle Petroleum – Direct Mount

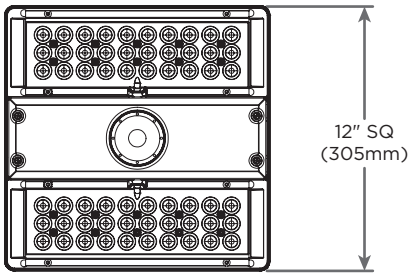
Product Description

Slim, low profile design. Lumianire 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 exisiting 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

PKG-304	SL	DM		E				
Product	**Optic**	**Mounting**	**LED Count (x10)**	**Series**	**Voltage**	**Color Options**	**Drive Current**	**Options**
PKG-304	**SL** Sparkle Petroleum	**DM** Direct Mount	**04** **06**	**E**	**UL** Universal 120–277V **UH** Universal 347–480V	**SV** Silver (Standard) **WH** White **BK** Black **BZ** Bronze **PB** Platinum Bronze	**700** 700mA (Standard) **525** 525mA **350** 350mA	**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**

† 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 is 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

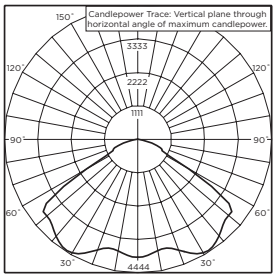
- **Input Voltage:** 120–277V or 347–480V, 50 / 60Hz, Class 1 drivers
- **Power Factor:** > 0.9 at full load
- **Total Harmonic Distortion:** < 20% at full load
- Integral 10kV surge suppression protection standard
- To address inrush current, slow blow fuse or type C / D breaker should be used

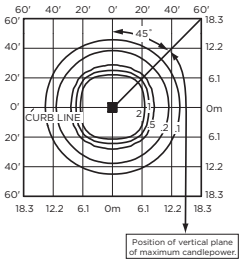
REGULATORY & VOLUNTARY QUALIFICATIONS

- 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 C62.41.2
- Luminaire and finish endurance tested to withstand 5,000 hours of elevated ambient salt fog conditions as defined in ASTM Standard B 117
- 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.





ITL Test Report #: 77415
CAN-304-SL-**-06-E-UL-700-40K
Initial Delivered Lumens: 12,707

PKG-304-SL-**-06-E-UL-700-40K
Mounting Height: 15′ (4.6m)
Initial Delivered Lumens: 12,760
Initial FC at grade

IES Files
To obtain an IES file specific to your project consult:
http://www.cree.com/lighting/tools-and-support/exterior-ies-configuration-tool

Lumen Output, Electrical, and Lumen Maintenance Data

Sparkle Petroleum Distribution												
LED Count (x10)	5700K		4000K		System Watts 120–480V	TOTAL CURRENT						50K Hours Projected Lumen Maintenance Factor*** @ 15˚C (59˚F)
	Initial Delivered Lumens*	BUG Ratings** Per TM-15-11	Initial Delivered Lumens*	BUG Ratings** Per TM-15-11		120V	208V	240V	277V	347V	480V	
350mA @ 25˚C (77˚F)												
04	5,243	B2 U0 G1	5,048	B2 U0 G1	46	0.39	0.24	0.22	0.21	0.15	0.12	94%
06	7,803	B3 U0 G1	7,514	B3 U0 G1	69	0.57	0.34	0.30	0.27	0.21	0.16	
525mA @ 25˚C (77˚F)												
04	7,340	B2 U0 G1	7,068	B2 U0 G1	71	0.59	0.35	0.31	0.28	0.21	0.16	93%
06	10,924	B3 U0 G1	10,519	B3 U0 G1	101	0.84	0.49	0.43	0.38	0.30	0.22	
700mA @ 25˚C (77˚F)												
04	8,912	B3 U0 G1	8,582	B3 U0 G1	94	0.79	0.46	0.40	0.36	0.28	0.21	91%
06	13,264	B3 U0 G1	12,773	B3 U0 G1	135	1.14	0.65	0.57	0.50	0.40	0.29	

* 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/Erratas/TM-15-11BugRatingsAddendum.pdf.
*** 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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PKG-304-SL-DM

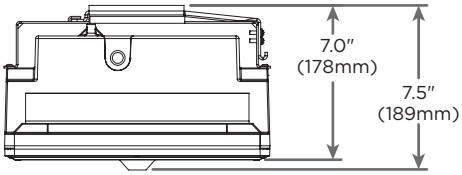
304 Series™ Parking Structure Luminaire – Sparkle Petroleum – Direct Mount

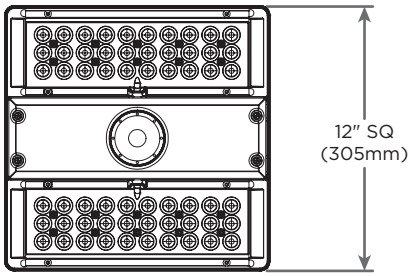
Product Description

Slim, low profile design. Lumianire 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 exisiting 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

PKG-304	SL	DM		E				
Product	**Optic**	**Mounting**	**LED Count (x10)**	**Series**	**Voltage**	**Color Options**	**Drive Current**	**Options**
PKG-304	**SL** Sparkle Petroleum	**DM** Direct Mount	**04** **06**	**E**	**UL** Universal 120–277V **UH** Universal 347–480V	**SV** Silver (Standard) **WH** White **BK** Black **BZ** Bronze **PB** Platinum Bronze	**700** 700mA (Standard) **525** 525mA **350** 350mA	**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**

† 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 is 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

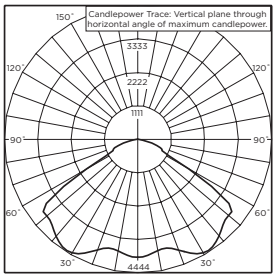
- **Input Voltage:** 120–277V or 347–480V, 50 / 60Hz, Class 1 drivers
- **Power Factor:** > 0.9 at full load
- **Total Harmonic Distortion:** < 20% at full load
- Integral 10kV surge suppression protection standard
- To address inrush current, slow blow fuse or type C / D breaker should be used

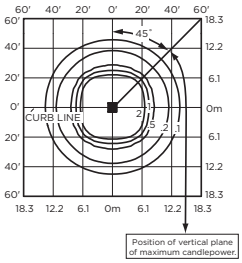
REGULATORY & VOLUNTARY QUALIFICATIONS

- 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 C62.41.2
- Luminaire and finish endurance tested to withstand 5,000 hours of elevated ambient salt fog conditions as defined in ASTM Standard B 117
- 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.





ITL Test Report #: 77415
CAN-304-SL-**-06-E-UL-700-40K
Initial Delivered Lumens: 12,707

PKG-304-SL-**-06-E-UL-700-40K
Mounting Height: 15′ (4.6m)
Initial Delivered Lumens: 12,760
Initial FC at grade

IES Files
To obtain an IES file specific to your project consult:
http://www.cree.com/lighting/tools-and-support/exterior-ies-configuration-tool

Lumen Output, Electrical, and Lumen Maintenance Data

Sparkle Petroleum Distribution												
LED Count (x10)	5700K		4000K		System Watts 120–480V	TOTAL CURRENT						50K Hours Projected Lumen Maintenance Factor*** @ 15˚C (59˚F)
	Initial Delivered Lumens*	BUG Ratings** Per TM-15-11	Initial Delivered Lumens*	BUG Ratings** Per TM-15-11		120V	208V	240V	277V	347V	480V	
350mA @ 25˚C (77˚F)												
04	5,243	B2 U0 G1	5,048	B2 U0 G1	46	0.39	0.24	0.22	0.21	0.15	0.12	94%
06	7,803	B3 U0 G1	7,514	B3 U0 G1	69	0.57	0.34	0.30	0.27	0.21	0.16	
525mA @ 25˚C (77˚F)												
04	7,340	B2 U0 G1	7,068	B2 U0 G1	71	0.59	0.35	0.31	0.28	0.21	0.16	93%
06	10,924	B3 U0 G1	10,519	B3 U0 G1	101	0.84	0.49	0.43	0.38	0.30	0.22	
700mA @ 25˚C (77˚F)												
04	8,912	B3 U0 G1	8,582	B3 U0 G1	94	0.79	0.46	0.40	0.36	0.28	0.21	91%
06	13,264	B3 U0 G1	12,773	B3 U0 G1	135	1.14	0.65	0.57	0.50	0.40	0.29	

* Actual production yield may vary between -4 and +10% of initial delivered lumens.
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*** 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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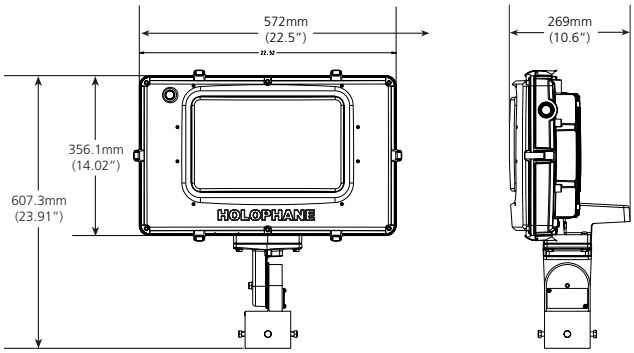
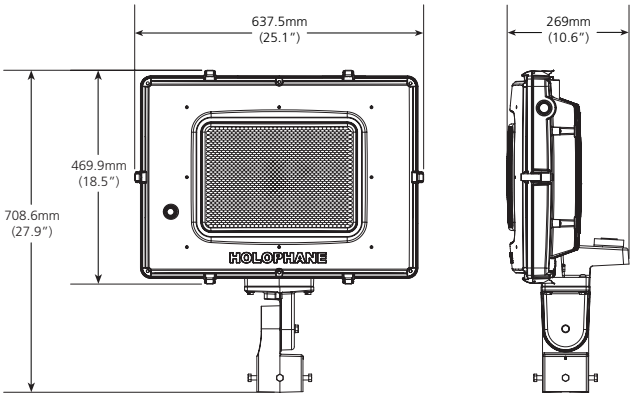
Ordering Information

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

Preferred Selections:

Most Frequently Ordered Catalog Numbers

PMLED-04-4K-07A-AS-66-1-L-ZP PMLED FV-Z

PMLED	6	5K	10A	AH	44	1	K	BP
1	6	3	4	5	6	7	8	9
Luminaire	LED Modules	Color Temp	Drive Current	Voltage	Beam Pattern	Mounting	UL Category	Color
PMLED PLLED	4 7 5 8 6 9	3K 4K 5K	10A	AS AH	44 45 55 65 66	1 3 4	K	BP GP HP WP ZP

Catalog Numbers for Entire Product Offering

(Pricing and lead times may be affected)

STEP 1: Luminaire

PMLED Predator LED Medium
PLLED Predator LED Large

STEP 2: LED Modules

4[1] 4 Modules
5[1] 5 Modules
6[1] 6 Modules
7[2] 7 Modules
8[2] 8 Modules
9[2] 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[9] 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
05 5′ cord length
06 6′ cord length
08 8′ cord length
10 10′ 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

DM[4] 0V-10V Dimmable driver
F1[9] Single fusing
F2[9] Double fusing
NL NEMA label
PCL1[3] DLL 120V-277V Photocontrol
PCL3[3] DLL 347V Photocontrol
PCL4[3] DLL 480V Photocontrol
PCSS[3] DSS 120-277V Photocontrol
P3[4] ANSI standard locking style receptacle that accepts 3 pin controls for on/off operation

STEP 12: Options (Continued)

P5[5,9] ANSI standard locking style 5-pin receptacle
P7[5,9] ANSI standard locking style 7-pin receptacle
SH[3] Shorting cap
TL Tool-less entry with latches

STEP 12: Accessories

PMLED FV-XX Full visor super durable paint with epoxy primer
PMLED UBV-XX Upper/bottom visor super durable paint with epoxy primer
PMLED VG Vandal guard
PMLED WG Wire guard
08657-XX[6] Yoke to 2.375″ OD tenon adaptor, super durable paint with epoxy primer
08775-XX[6] Yoke to 2.375″ OD tenon adaptor with photocontrol receptacle, super durable paint with epoxy primer

1. Available with PMLED only
2. Available with PLLED only
3. Must be used with P3 or P5
5. Not available with P5 option
4. Not available with P3 option
5. Available with mounting 3 and 4 only
7. PMLED Not Available with PMLEDF1, PMLEDF2
8. PMLED Not Available with TB option
9. Accepts 3-pin and 5-pin as well. The 5-pin controls fixture dimming.

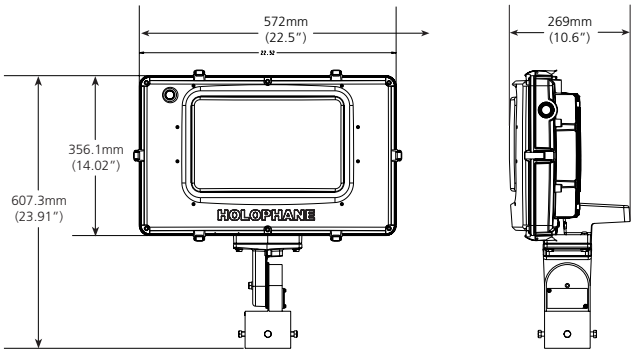
Operating Characteristics

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.

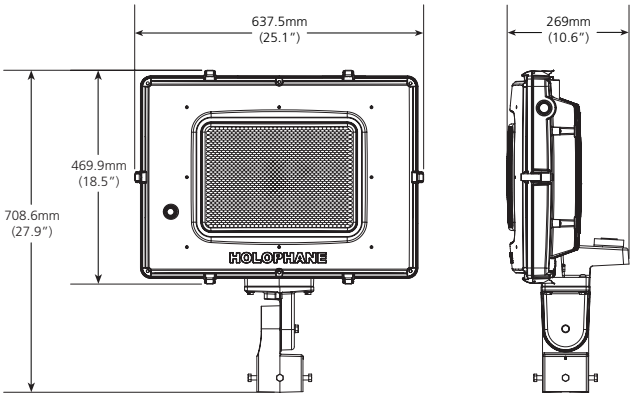
Replacement	HID Wattage CWA Type	Modules	Lumens	LED Wattage	LPW	Savings
PLLED 1000 HPS	1100	9 COB/10A	48,000	391	123	64%
PMLED 1000 MH	1070	6 COB/10A	32,000	261	123	75%
PMLED 750 MH	820	6 COB/10A	32,000	261	123	68%
PMLED 400 HPS	464	4 COB/10A	22,000	177	123	61%

Ordering Information

Dimensional Details



PMLED
Maximum weight: 40lbs (18kg) Knuckle
Maximum weight: 47lbs (21kg) Yoke
Maximum E.P.A.: 3.1 sq. ft.



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Maximum weight: 54lbs (24kg) Knuckle
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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.

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8[2] 8 Modules
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4K 4,000K
5K 5,000K

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45 4x5 (Prismatic glass)
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66 6x6 (Prismatic glass)

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3 Yoke Stainless Steel
4 Yoke galvanized

STEP 8: UL Category

K Wet locations
L[9] Marine Outside

STEP 9: Color

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GP Gray Super durable with epoxy primer
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15 15′ cord length
20 20′ cord length
25 25′ cord length
30 30′ cord length

STEP 11: Cord Type

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43 14 gage, 3 conductor
23 12 gage, 3 conductor

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F1[9] Single fusing
F2[9] Double fusing
NL NEMA label
PCL1[3] DLL 120V-277V Photocontrol
PCL3[3] DLL 347V Photocontrol
PCL4[3] DLL 480V Photocontrol
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STEP 12: Options (Continued)

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TL Tool-less entry with latches

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8. PMLED Not Available with TB option
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PMLED 750 MH	820	6 COB/10A	32,000	261	123	68%
PMLED 400 HPS	464	4 COB/10A	22,000	177	123	61%

6" LED Open Downlight

RLF6LEDG4

120V–277V

0-10V Dimming

DATE: TYPE:

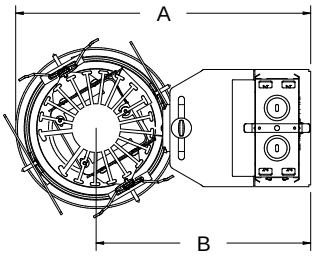
FIRM NAME:

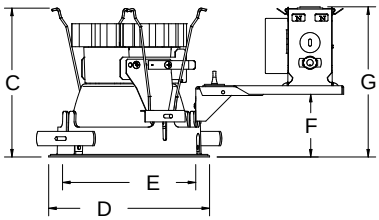
PROJECT:

RETROFICIENT

ENERGY STAR

Ceiling Cutout: see guide
Maximum Ceiling Thickness 1½"
For conversion to millimeters, multiply inches by 25.4
Not to Scale





*Dimensions shown are for range of adjustability.

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:

High purity aluminum, Alzak, iridescence suppressed, semi-diffuse upper reflector. Self-trim standard. Painted white self-trim (WT) available as option. Reflector is made from anodized Alanod Miro 4 aluminum.

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.

	"A"*	"B"*	"C"*	"D"*	"E"*	"F"*	"G"*
RLF6LEDG4 6LFLED5G4 RLF6LEDG4 6LFLED6G4 RLF6LEDG4 6LFLED7G4	12-3/4" - 15"	8-7/8" - 10-3/4"	6-3/4"	7"	5-3/4"	2-1/2" - 3-3/4"	6-1/4" - 7-1/2"

EXAMPLE: RLF6LEDG4 - 6LFLED5G430K
EXAMPLE: RLF6LED7G4120HDM-6LFLED7G435KWHWT

CATALOG NUMBER:

Order housing, reflector, and accessories separately

STANDARD 0-10V DIMMING

HOUSING/LED GENERATION	VOLTAGE	OPTIONS	TRIM	LED COLOR TEMP	REF. FINISH	LOWER REF. COLOR	REF. OPTIONS	ACCESSORIES
❑ **RLF6LEDG4** 6" High Efficacy LED Housing	❑ **Blank** 120V–277V	❑ **Blank** Standard 0-10V dimming to 10% ❑ **SD**[1] Small Diameter	❑ **6LFLED5G4** 1100 Lumen Module ❑ **6LFLED6G4** 1500 Lumen Module ❑ **6LFLED7G4** 2000 Lumen Module	❑ **30K** ❑ **35K** ❑ **40K**	❑ **Blank** Semi-Diffuse	❑ **Blank** Clear ❑ **CG** Champagne Gold ❑ **BL** Black ❑ **WE** Wheat ❑ **LW** Light Wheat ❑ **PW** Pewter ❑ **WH**[1] White Paint	❑ **WT** White Trim ❑ **WF** Wide Flange	❑ **LFSC6** 6" reflector screw cover ❑ **LiteGear** See page 3 for availability ❑ **RWD6** Retrofit wide diameter housing kit

ALTERNATIVE DIMMING TO 1%

Use with HDM/DM1/2DM dimming option: Match Housing to Trim Output

❑ **RLF6LED5G4** ❑ **RLF6LED6G4** ❑ **RLF6LED7G4**	❑ **120** ❑ **277**	❑ **HDM**[3] Lutron 3-wire Eco System to 1% ❑ **2DM**[3] Lutron 2-wire Leading Edge to 1% (120V only) ❑ **DM1**[3] 0-10V dimming to 1% ❑ **SD**[1] Small Diameter

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

prescolite

A Division of Hubbell Lighting, Inc.

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

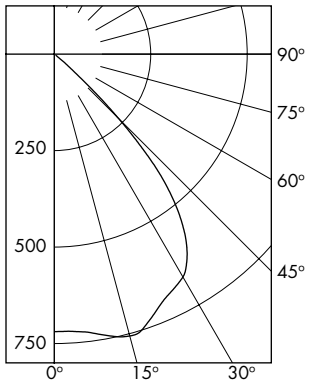
Retroficient - 6" RLF6LEDG4 Downlight

DRIVER DATA	RLF6LED5G4 30K	RLF6LED7G4 30K
Input Voltage	120-277V	120-277V
Input Frequency	50/60 Hz	50/60 Hz
Input Current	0.12A (120v)	0.22A (120v)
	0.052A (277v)	0.10A (277v)
Input Power	14.5W	26.5W
Constant Current Output	200–1000mA	200–1000mA
Power Factor	≥0.90	≥0.90
THD	<20%	<20%
EMI Filtering	FCC 47CFR	FCC 47CFR
	Part 15, Class A	Part 15, Class A
Operating Temperature	-20°C to 40°C	-20°C to 40°C
Dimming	0-10V	0-10V

Over-voltage, over-current, short-circuit protected

*Power consumption and photometric output may vary slightly with HDM or 2DM driver

RLF6LEDG4 6LFLED5G4 30K
LED Light Engine: 3000K, 80 CRI
System Wattage: 14.5W
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	

Test No. 8458
Tested at 25°C Ambient in accordance to IESNA LM-79-2008

ZONAL LUMEN SUMMARY

ZONE	LUMENS	%LUMINAIRE
0-30	602	52.0
0-40	967	83.6
0-60	1157	100.0
0-90	1157	100.0
90-180	0	0.0
0-180	1157	100.0

LUMINANCE DATA IN CANDELA/ SQ. METER

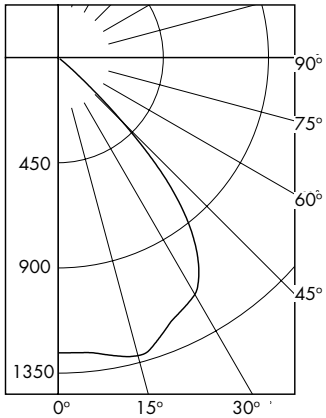
Angle in Vertical	Average
45°	18290
55°	382
65°	0
75°	0
85°	0

COEFFICIENTS OF UTILIZATION Zonal Cavity Method

Room Cavity Ratio	% Effective Ceiling Cavity Reflectance																
	80%				70%				50%			30%			10%		
	20% Effective Floor Cavity Reflectance																
	% Wall Reflectance																
	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10
1	113	110	107	105	110	108	105	103	104	102	100	100	98	97	96	95	94
2	107	101	97	93	104	99	95	92	96	93	90	93	90	88	90	88	86
3	100	93	87	83	98	92	87	82	89	85	81	86	83	80	84	81	79
4	94	86	80	75	92	85	79	74	82	77	73	80	76	73	78	75	72
5	88	79	73	68	87	78	72	67	76	71	67	74	70	66	73	69	65
6	83	73	66	61	82	72	66	61	71	65	61	69	64	60	68	63	60
7	78	68	61	56	77	67	61	56	66	60	56	64	59	55	63	59	55
8	74	63	56	51	72	62	56	51	61	55	51	60	55	51	59	54	51
9	69	58	52	47	68	58	52	47	57	51	47	56	51	47	55	50	47
10	65	55	48	44	64	54	48	44	53	47	43	52	47	43	52	47	43

RLF6LEDG4 6LFLED5G4 30K — Test No. 8458

RLF6LEDG4 6LFLED7G4 30K
LED Light Engine: 3000K, 80 CRI
System Wattage: 26.4W
Fixture Delivered Lumens: 2013
Fixture Efficacy: 76.1
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	

Test No. 8459
Tested at 25°C Ambient in accordance to IESNA LM-79-2008

ZONAL LUMEN SUMMARY

ZONE	LUMENS	%LUMINAIRE
0-30	1053	52.3
0-40	1690	83.9
0-60	2011	99.9
0-90	2013	100.0
90-180	0	0.0
0-180	2013	100.0

LUMINANCE DATA IN CANDELA/ SQ. METER

Angle in Vertical	Average
45°	30302
55°	860
65°	259
75°	0
85°	0

COEFFICIENTS OF UTILIZATION Zonal Cavity Method

Room Cavity Ratio	% Effective Ceiling Cavity Reflectance																
	80%				70%				50%			30%			10%		
	20% Effective Floor Cavity Reflectance																
	% Wall Reflectance																
	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10
1	113	110	107	105	110	108	105	103	104	102	100	100	98	97	96	95	94
2	107	101	97	93	104	99	95	92	96	93	90	93	90	88	90	88	86
3	100	93	88	83	98	92	87	82	89	85	81	86	83	80	84	81	79
4	94	86	80	75	92	85	79	74	82	77	73	80	76	73	78	75	72
5	89	79	73	68	87	78	72	67	76	71	67	75	70	66	73	69	66
6	83	73	66	62	82	72	66	61	71	65	61	69	64	60	68	63	60
7	78	68	61	56	77	67	61	56	66	60	56	64	59	55	63	59	55
8	74	63	56	52	72	62	56	51	61	55	51	60	55	51	59	54	51
9	69	59	52	47	68	58	52	47	57	51	47	56	51	47	55	50	47
10	66	55	48	44	64	54	48	44	53	48	44	52	47	43	52	47	43

RLF6LEDG4 6LFLED7G4 30K — Test No. 8459

prescolite

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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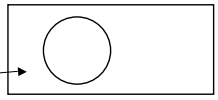
HUBBELL® Lighting, Inc.

PHOTOMETRIC DATA

Retroficient - 6" RLF6LEDG4 Downlight

Housing Compatibility Guide		
Ordering Guidelines	6 inch	
	min	max
Requires SD Housing Option	5-15/16	6-1/8
All Standard Housings	6-1/8	6-1/2
Requires RWD Kit Accessory & WF Reflector Option	6-1/2	6-7/8

Dimensions shown are for the diameter of the frame flange at it's 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/

Dimming Compatibility Table

Dimming Ballast	Manufacturer	Web Link
DM/DM1	Lutron DVTV	http://bit.ly/11jSvZg
DM/DM1	Leviton AWRMG-7xx, AWSMG-7xx, AWSMT-7xx	http://bit.ly/1BJn2R9
HDM	Lutron	http://bit.ly/1vtjHAl
2DM	Lutron	http://bit.ly/1nF4Zp1

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SIL-1X4-XL-F-UL-40K-CW8-JP

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(352) 692-5900 FL

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 - Solid State Strip

Application

SIL – 1x4 – ML – F – UL – 40K – SH – C8

SIL	1x4	ML	F	UL	40K	SH	C8
Model	Fixt Size	Lumen Output	Driver Output	Voltage	Color Temp.	Occ. Sensor	Cord Plug

Fixture Series
SIL = LED Strip Fixture

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 asistance.
(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

Occupancy Sensor
SH = 360 View Hi-Bay Sensor

Cord & Plug
C8 = 8' Cord, No Plug
C8/L715 = 8' Cord & Plug (L7-15P)
PQC15 = 15' Cord/Quick Connect

Other
LSP = Lighting Surge Protector (270 Joules)

5 YR Warranty | RoHS | 40°C Max | -40°C Min | Damp Location | CSA | DLC Pending | lighting facts Pending

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SIL - Standard LED Strip

Want Fluorescent?

Consider our...

RWS

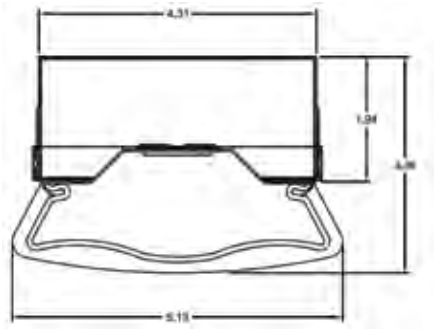
SIH

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

Existing Lamp / Ballast System	Lamp Quantity & Type		Mean Lumens Per Lamp	Mean Lumens Per Fixture	Ballast Factor	Approx. Fixture Efficiency	Delivered Lumens Per Fixture	Input Watts	Delivered Lumens Per Watt
2L40-T12 Mag	2	F40/T12/WM	2,280	4,560	0.88	0.75	3,010	72	42
1L96-T12 Mag	1	F96/T12/ES	4,750	4,750	0.88	0.75	3,135	76	41
2L96-T12 Mag	2	F96/T12/ES	4,750	9,500	0.88	0.75	6,270	126	50
1L96-T12HO Mag	1	F96/T12HO/ES	6,950	6,950	0.95	0.75	4,952	125	40
2L96-T12HO Mag	2	F96/T12HO/ES	6,950	13,900	0.93	0.75	9,695	210	46
2L32-T8-MP Elec	2	F32T8/841	2,800	5,600	0.87	0.75	3,654	53	69
2L32T8-HP Elec	2	F32T8/841	2,800	5,600	1.15	0.75	4,830	73	66

Re-Lighting Options

Proposed System	Lamp Source Quantity & Type		CRI	CCT	Ballast Factor	Approx. Fixture Efficiency	Delivered Lumens Per Fixture	Input Watts	Delivered Lumens Per Watt
SIL-1X4-XL	1	1X4 XL Engine	>80	4500K	1.00	1.00	2,900	31	94
SIL-1X4-LW	1	1X4 LW Engine	>80	4500K	1.00	1.00	5,019	51	98
SIL-1X4-ML	1	1X4 ML Engine	>80	4500K	1.00	1.00	6,872	72	95
SIL-1X4-HL	1	1X4 HL Engine	>80	4500K	1.00	1.00	8,781	95	92
SIL-1X8-XL	1	1X8 XL Engine	>80	4500K	1.00	1.00	5,800	62	94
SIL-1X8-LW	1	1X8 LW Engine	>80	4500K	1.00	1.00	10,038	102	98
SIL-1X8-ML	1	1X8 ML Engine	>80	4500K	1.00	1.00	17,562	190	92
SIL-1X8-HL	1	1X8 HL Engine	>80	4500K	1.00	1.00	11,600	124	94

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 lumen 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.
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- Please consult the lamp/ballast manufacturer's catalogs for the detailed information required to model your system.

SIL-1X8-XL-F-UL-40K-CW8-JP

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Voltage
UL = Universal 120-277

Color Temperature
35K = 3500K
40K = 4000K
50K = 5000K

Occupancy Sensor
SH = 360 View Hi-Bay Sensor

Cord & Plug
C8 = 8' Cord, No Plug
C8/L715 = 8' Cord & Plug (L7-15P)
PQC15 = 15' Cord/Quick Connect

Other
LSP = Lighting Surge Protector (270 Joules)

5 YR Warranty | RoHS | 40°C Max | -40°C Min | Damp Location | DLC Pending | Lighting facts Pending

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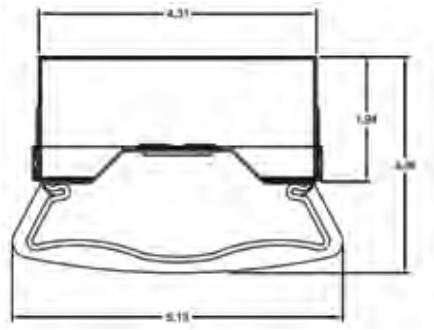

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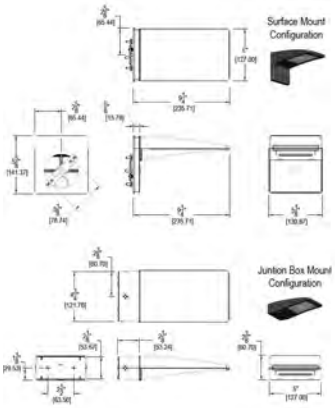
WPLED13N/PC2

LED 10W & 13 Wallpacks. 3 cutoff options. 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:	N/A
208V:	0.08A
240V:	0.07A
277V:	0.06A
Input Watts:	15W
Efficiency:	87%

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:
RAB's range of CCT (Correlated color temperature) follows the guidelines of the American National Standard for Specifications for the Chromaticity of Solid State Lighting (SSL) Products, ANSI C78.377-2008.

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.

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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.

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WPLED3T78N/PCS2

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

Project:	Type:
Prepared By:	Date:

Driver Info

Type:	Constant Current
120V:	N/A
208V:	0.41A
240V:	0.35A
277V:	0.30A
Input Watts:	75W
Efficiency:	N/A

LED Info

Watts:	78W
Color Temp:	4000K
Color Accuracy:	72 CRI
L70 Lifespan:	100000
Lumens:	8941
Efficacy:	118 LPW

Technical Specifications

Electrical

Photocell:

277V Swivel Photocell Included. Photocell is compatible with 208V-277V.

Driver:

Constant Current, Class 2, 2000mA, 100-277V, 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 warrantied to shift no more than 200K in CCT over a 5 year period.

Color Temperature (Nominal CCT):

4100K.

Color Uniformity:

RAB's range of CCT (Correlated Color Temperature) follows the guidelines of the American National Standard for Specifications for the Chromaticity of Solid State Lighting (SSL) Products, ANSI C78.377-2015.

Replacement:

Replaces 400W Metal Halide.

Construction

IP Rating:

Ingress Protection rating of IP66 for dust and water

Ambient Temperature:

SuitableFor use in 40°C (104°F) ambient temperatures.

Cold Weather Starting:

Minimum starting temperature is -40°C (-40°F)

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

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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.

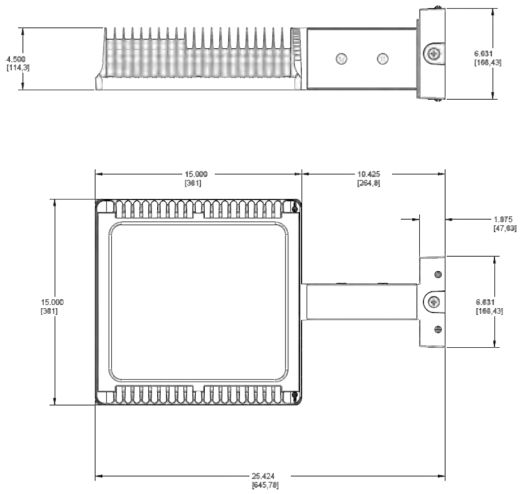
Patents:

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

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WPLED3T78N/PCS2

Ordering Matrix

Family	Distribution	Watts	Color Temp	Mount	Finish	Voltage	Photocell	Dimming	Sensor	Bi-Level
WPLED										
	2T = Type II **3T** = Type III **4T** = Type IV	**78** = 78W	**Blank** = 5000K (Cool) **Y** = 3000K (Warm) **N** = 4000K (Neutral)	**Blank** = Standard **FX** = Flat Wall	**Blank** = Bronze **W** = White	**Blank** = 120-277V **/480** = 480V	**Blank** = No Photocell **/PC** = 120V Button **/PC2** = 277 Button **/PCS** = 120V Swivel **/PCS2** = 277V Swivel **/PCS4** = 480V Swivel	**Blank** = No Dimming **/D10** = Dimmable	**/WS2** = Multi-Level Motion Sensor (Only available for 120-277V with /D10 for 50W)	**Blank** = No Bi-Level **/BL** = Bi-Level

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Johnson Controls

Lighting Material Manuals

Port Allen Harbor

HDOT Harbors, Highways, & Tunnels

JCI Contract: 4PX0-0031

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Catalog

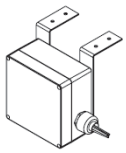
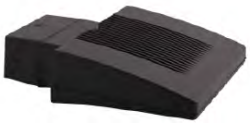
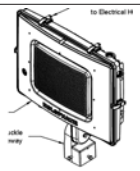
Part Name	Image	Additional Description
ELWG0CXXGC		GE - LIGHTGRID GATEWAY
ELWK0A5		GE - LIGHTGRID NODE BOX ASSY 277V
ELWM0CXV		GE - LIGHTGRID CELLULAR MODEM
ELWN0A5		GE - LIGHTGRID NODE 277V
RAB WPLED18NPC2		WPLED18N/PC2
RAB WPLED26NPC2		WPLED26N/PC2
Holo PMLED 06 4K-277V		PMLED-06-4K-07A-AS-66-1-L-ZP PMLED FV-ZP
Precision LLW-4-40-LW-E-U		LLW-4-40-LW-E-U
CREE PKG-304		PKG-304-PD-06-E-UL-SV-700-PML

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TABLE OF CONTENTS

Catalog

Part Name	Image	Additional Description
Precision VTL-1X4-XL		VTL-1X4-XL-F-UL-40K
Precision VTL-1X8-XL		VTL-1X8-XL-F-UL-40K-C8

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ELWG-0-C-XX-G-C

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

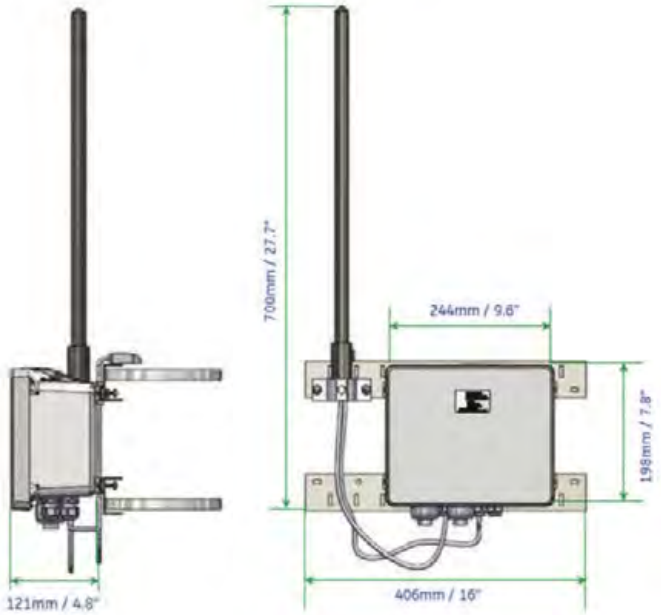
- Street Lighting
- Area Lighting

2014 PROGRESS Report SELECTION

Product Specifications

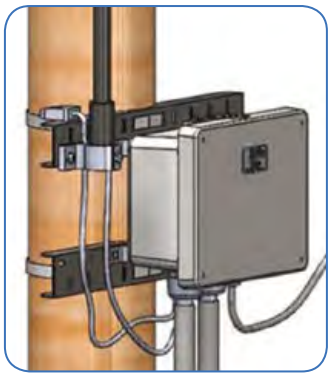
- Input Voltage: 120-277V, 347V—480V
- Operating Temperature: -40 to +50C
- Surge: Meets ANSI C62.41 6KV, 3KA Combination Wave
- Power Consumption: < 3W
- Frequency: 915 MHz ISM Band
- GPS: Accuracy 3m (clear open sky)
- Addressing: IPv6
- Security: AES Encryption, Certificate Based
- Network Communication: 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

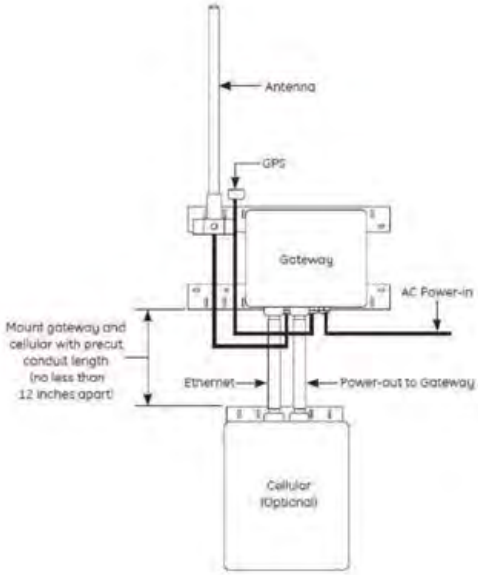
Product Dimensions



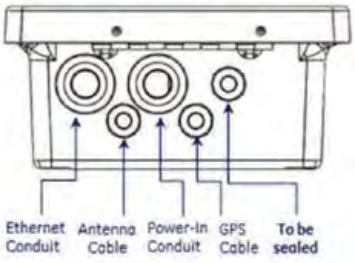
Installation

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.

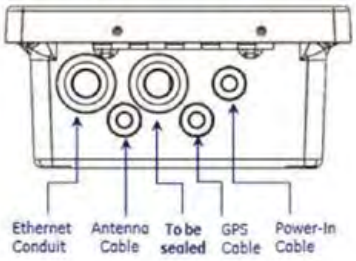




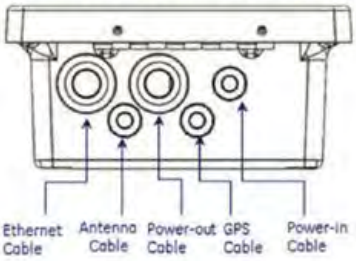
OPTION 1: Power & Ethernet input using conduit (**NO** power-out to external device)



OPTION 2: Power-in via cable. Ethernet in via conduit (**NO** power-out to external device)



OPTION 3: Power-in via cable; Power & Ethernet out to cellular modem via conduit



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

E L W G – – – – **C** – – **G** – **C** – –

PRODUCT ID	VOLTAGE (UL)	ANTENNA	COUNTRY/POLE	GPS	IP COMMUNICATION	NETWORK CONFIGURATION
E L W G	**0** = 120/277 **H** = 480* * 480V Gateway = 120-277V Gateway + 480V to 277V Step Down Transformer	**C** = Standard 18"	**XX** = Default (US) **AR** = Argentina **BR** = Braziil **EL** = El Salvador	**G** = GPS Capability	**C** = Cat 5 Cable Only	**B** = Network B **None** = Default

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CTRL002 (Rev 06/10/15)

ELWM-0-C-X-V

GE
Lighting

LightGrid™ Cell Modem

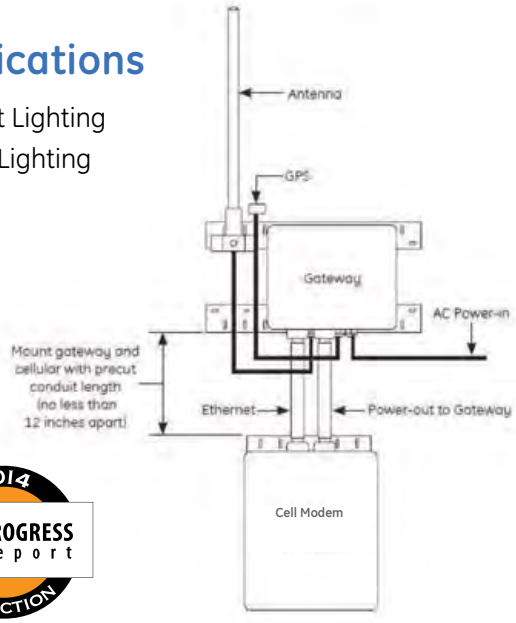
Outdoor Wireless Control System

Description

LightGrid™ Outdoor Wireless Control System from GE allows remote monitoring and control, utility-grade energy measurement and GPS mapping of streetlights.

Applications

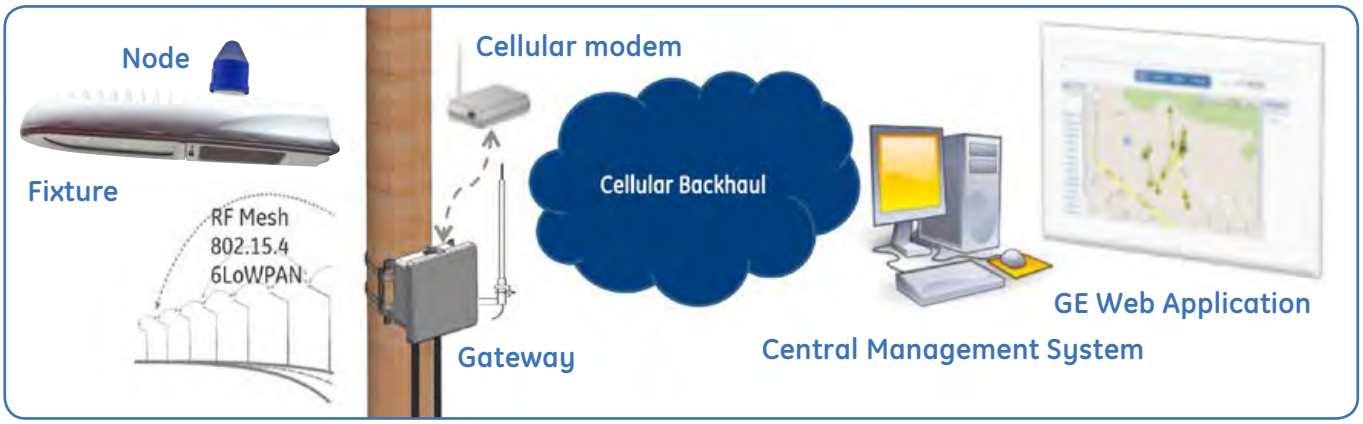
- Street Lighting
- Area Lighting



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)

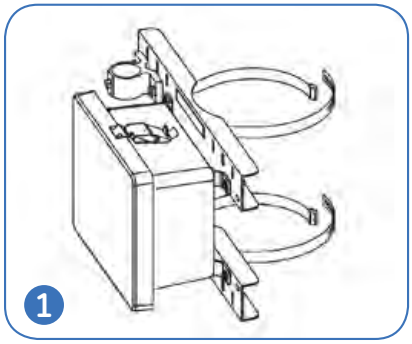
Ordering Number Logic

E L W M — O — C — X — _

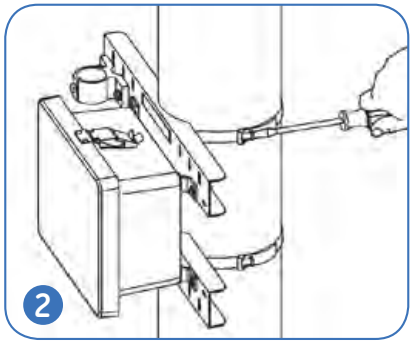
PRODUCT ID	VOLTAGE	IP COMMUNICATION	FUTURE USE	PROVIDER
E L W M	0 = 120-277	C = CAT 5 Cable only	X	V = Verizon R = Rogers X = Future Use

Mounting Gateway and Cellular

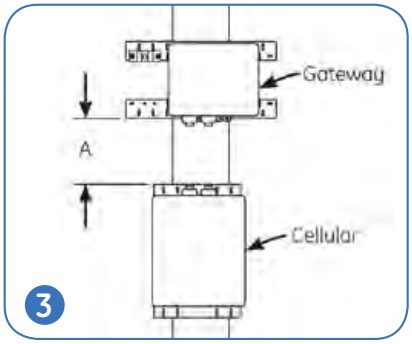
Carefully unpack unit from its packaging. Properly inspect for defects before installing.



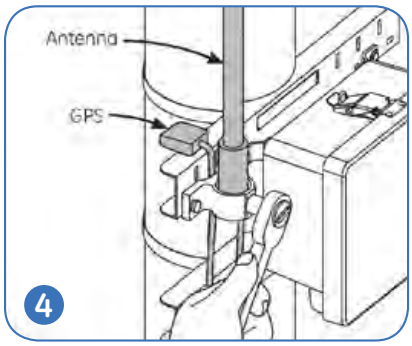
Before attaching gateway enclosure to pole, ensure the mount band clamps are correctly oriented. **NOTE:** Adjustable steel band allows mounting on pole diameters up to 15 inches.



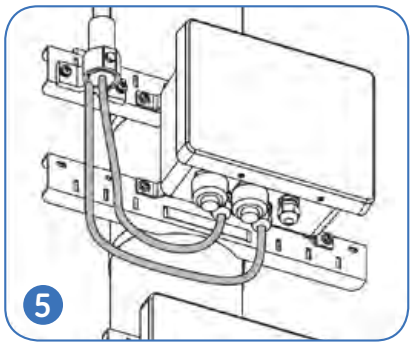
Attach gateway enclosure to pole by tightening steel band clamps. Fold or trim excess metal band if needed.



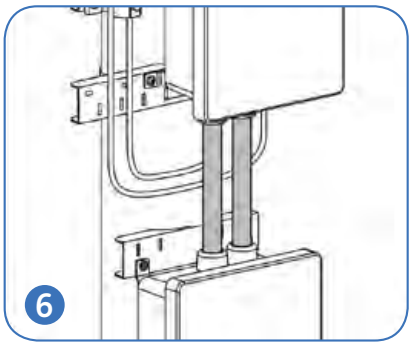
Position cellular enclosure below the gateway enclosure and attach to pole by tightening both steel band clamps. **NOTE:** The distance (A) between the two enclosures should be adjusted to accommodate the length of the Ethernet cable and power-in/out cable.



Install GPS and antenna into bracket and tighten bolt (45 lbs-in. torque).



Insert GPS and antenna wires through two glands in bottom of gateway enclosure.



Install two 0.75-inch diameter nonmetallic Type B liquid-tight conduit between gateway and cellular enclosures.

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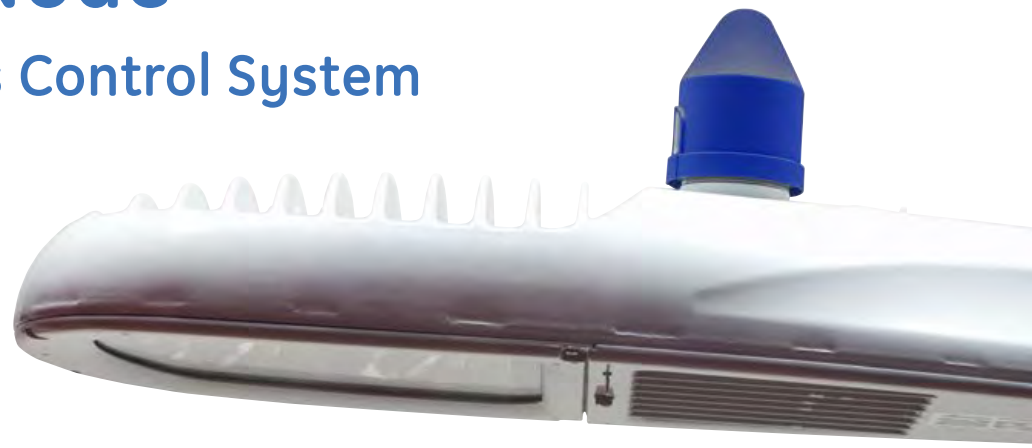
CTRL009 (Rev 06/10/15)

ELWN0A5

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.

Applications

- Street Lighting
- Area Lighting

2014 PROGRESS Report SELECTION

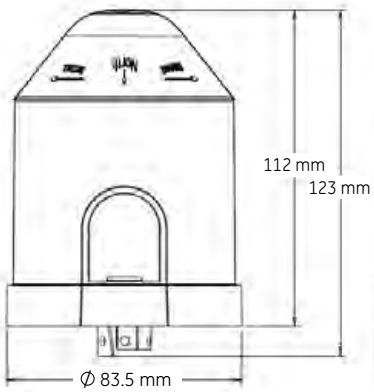
Product Features

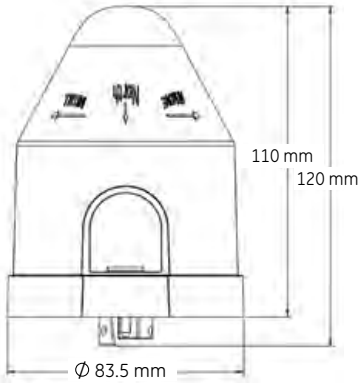
- Utility Grade Measurement up to 0.5% Accuracy
- Self-forming & self-restoring mesh network
- Static IPV6 data addressing and routing
- Reliable and Secure Encrypted Communications
- Nodes, gateway can be spaced up to 500m apart (Clear Line of Sight)
- Utility grade 15 minute time of use Energy consumption 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

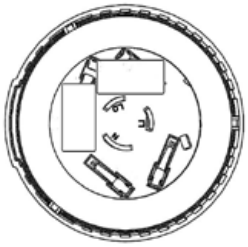
Product Specifications

- 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







ANSI Dimming

GE Dimming

Ordering Number Logic

E L W N _ _ _ _ _ 5 _ _ G _ 5 _ _ _

PRODUCT ID	VOLTAGE	PIN CONFIGURATION	PINS	METERING	GPS	MAX WATTAGE	NETWORK CONFIGURATION	COUNTRY/POLE
E L W N	**0** = 120/277 **5** = 480	**D** = GE Dimming **A** = ANSI Dimming	**5** = 5 Pin	**R** = 2% Revenue Grade **U** = 0.5% Utility Grade	**G** = GPS Capability	**5** = 450 Watts	**S** = Stand Alone **B** = Network B **None** = Default	**None** = Default (US)

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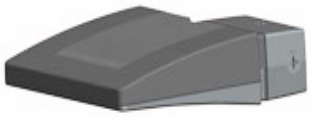
CTRL001 (Rev 06/10/15)

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

Surface Mount

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.

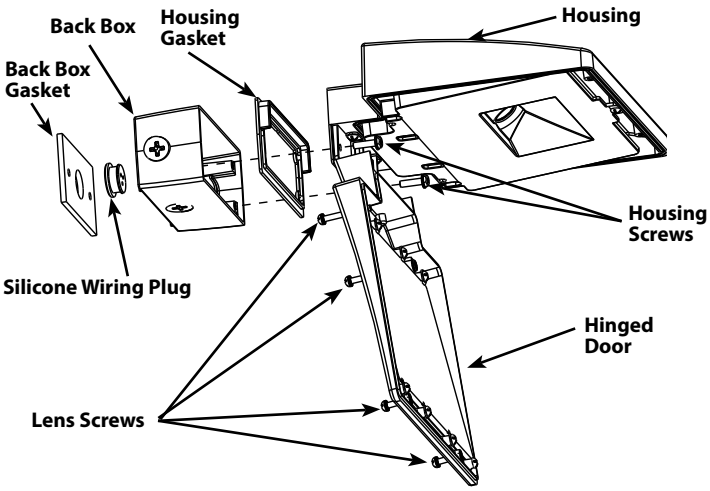
WARNING: Make certain power is OFF before installing or maintaining fixture. No user serviceable parts inside.

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.

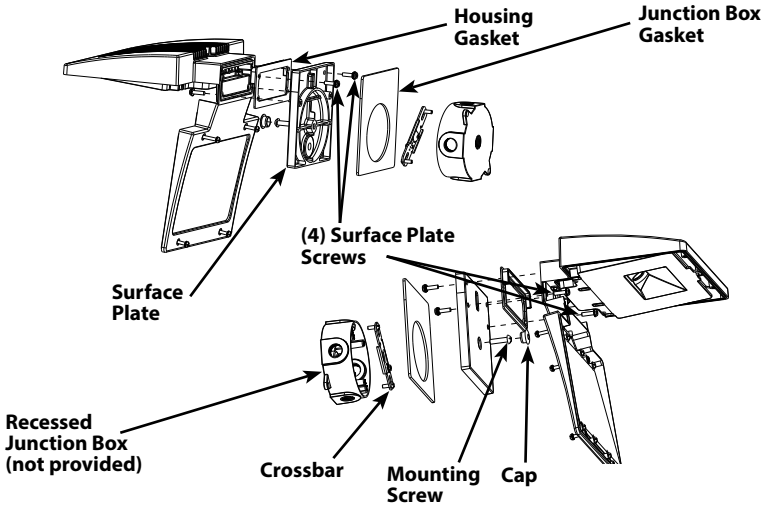
1. Loosen (4) **Lens Screws** and swing open **Hinged Door**. Screws will remain in place with O-Rings.
2. Loosen and remove (2) **Housing Screws**. Remove **Housing** from **Back Box**. Keep **Housing Gasket** intact for re-assembly.
3. Feed wires into **Back Box** through **Silicone Wiring Plug**, 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 uplight 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 uplight position.

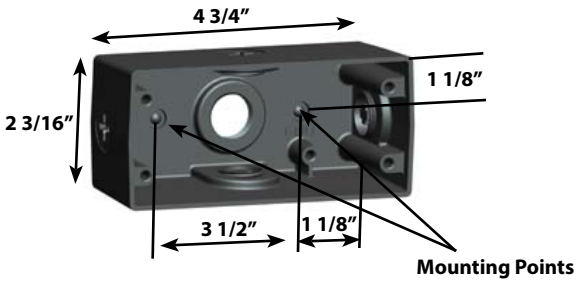


WPLED® 18W INSTALLATION INSTRUCTIONS

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.



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.

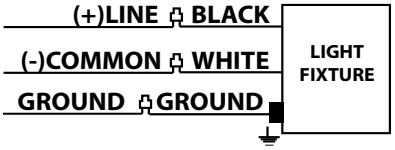


Fig. 1

CLEANING & MAINTENANCE

CAUTION: Be sure fixture temperature is cool enough to touch. Do not clean or maintain while fixture is energized.

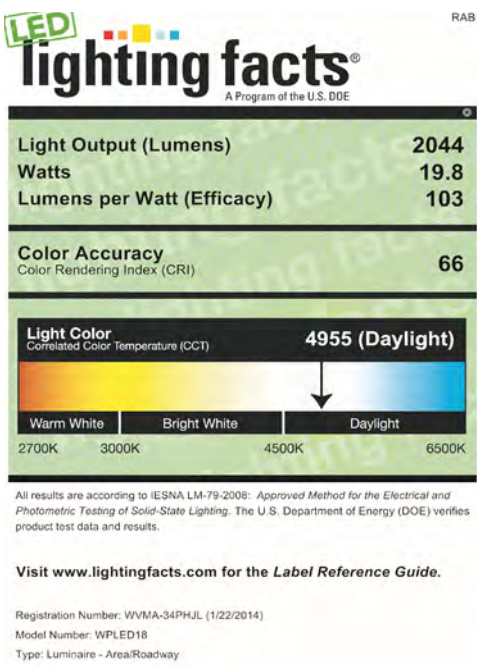
1. Clean glass lens with non-abrasive glass cleaning solution.
2. Do not open fixture to clean the LED. Do not touch the LED.

TROUBLESHOOTING

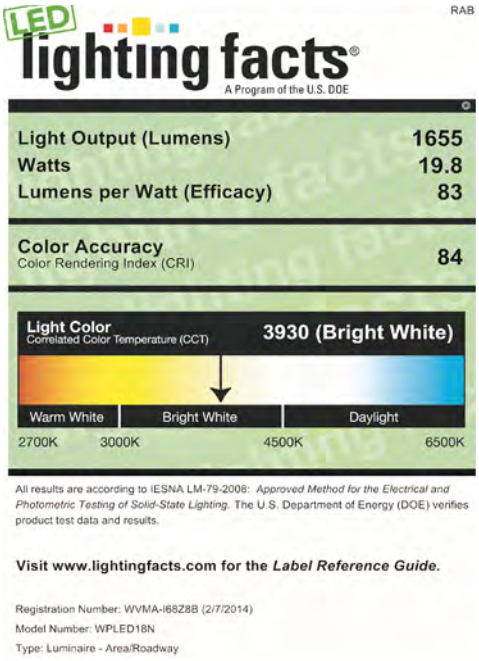
1. Check that the line voltage at fixture is correct. Refer to wiring directions.
2. Is the fixture is grounded properly?
3. Be sure the photocell, if used, is functioning properly.

PATENTS: US: pat. D634,878, **CN:** ZL201030679778.2

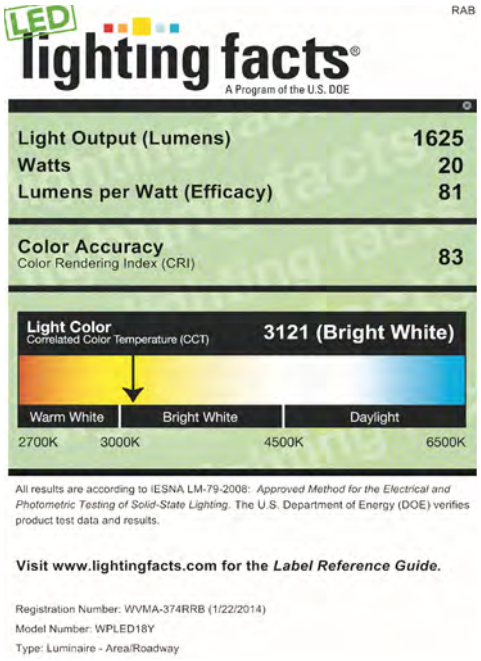
WPLED18 Cool



WPLED18N Neutral



WPLED18Y Warm



Note: These instructions do not cover all details or variations in equipment nor do they provide for every possible situation during installation, operation or maintenance.

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Northvale, New Jersey 07647 USA

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

WPLED18-IN 0214 Rev. 1

WPLED26N/PC2

LED 26W Wallpacks. Patent Pending thermal management system. 100,000 hour L70 lifespan. 5 Year Warranty.

Color: Bronze

Weight: 7.5 lbs

Project:	Type:
Prepared By:	Date:

Driver Info		LED Info	
Type:	Constant Current	Watts:	26W
120V:	N/A	Color Temp:	4000K (Neutral)
208V:	0.16A	Color Accuracy:	83 CRI
240V:	0.14A	L70 Lifespan:	100,000
277V:	0.12A	Lumens:	2,415
Input Watts:	30W	Efficacy:	81 LPW
Efficiency:	88%		

Technical Specifications

Other

WPLED26 with Photocell:

277V Button Photocell Included. Photocell is compatible with 208V-277V.

California Title 24:

WPLED26/PC2 complies with 2013 California Title 24 building and electrical codes as a commercial outdoor non-pole-mounted fixture < 30 Watts.

Equivalency:

The WPLED26 is Equivalent in delivered lumens to a 175W Metal Halide Wallpack.

HID Replacement Range:

The WPLED26 can be used to replace 150 - 200W Metal Halide Wallpacks based on delivered lumens.

Patents:

The WPLED design is protected by U.S. Pat. D634878, Canada Pat 134878, China Pat. CN301649064S.

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.

Listings

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 warrantied to shift no more than 200K in CCT over a 5 year period.

Color Uniformity:

RAB's range of CCT (Correlated color temperature) follows the guidelines of the American National Standard for Specifications for the Chromaticity of Solid State Lighting (SSL) Products, ANSI C78.377-2015.

Construction

IP Rating:

Ingress Protection rating of IP66 for dust and water.

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

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WPLED26N/PC2

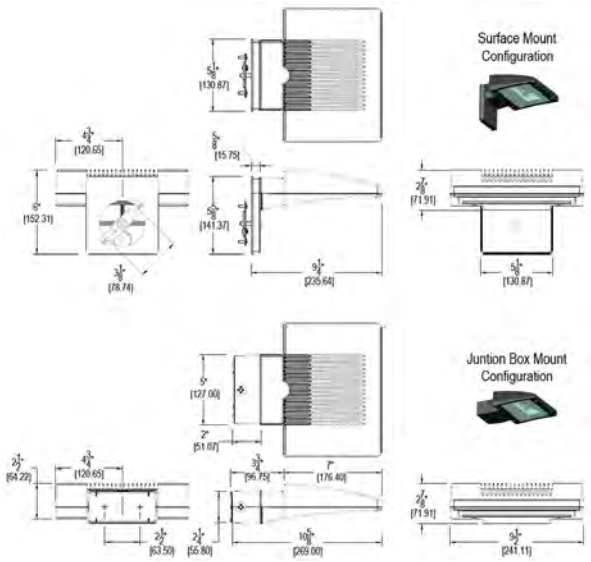
Technical Specifications (continued)

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

Family	Watts	Color Temp	Sensor	Surface Plate	Finish	Photocell	Dimming
WPLED							
	26 = 26W	= Cool **Y** = Warm **N** = Neutral	= No Sensor **MS** = Mini Sensor	= No Surface Plate **S** = Surface Plate	= Bronze **W** = White	= No Photocell **/PC** = 120V Button **/PCS** = 120V Swivel **/PC2** = 277V Button	= No Dimming **/D10** = Dimmable

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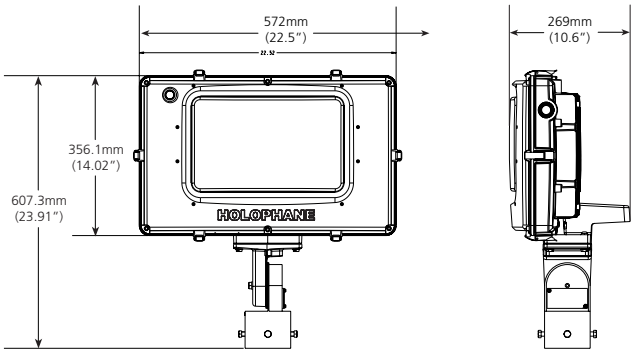
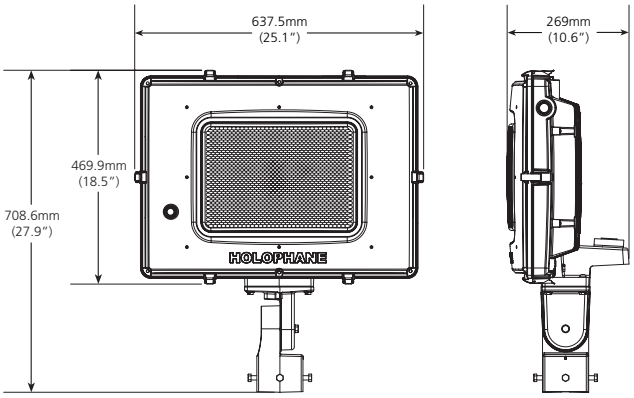
Ordering Information

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

Preferred Selections:

Most Frequently Ordered Catalog Numbers

PMLED-04-4K-07A-AS-66-1-L-ZP PMLED FV-Z

PMLED	6	5K	10A	AH	44	1	K	BP
1	6	3	4	5	6	7	8	9
Luminaire	LED Modules	Color Temp	Drive Current	Voltage	Beam Pattern	Mounting	UL Category	Color
PMLED PLLED	4 7 5 8 6 9	3K 4K 5K	10A	AS AH	44 45 55 65 66	1 3 4	K	BP GP HP WP ZP

Catalog Numbers for Entire Product Offering

(Pricing and lead times may be affected)

STEP 1: Luminaire

PMLED Predator LED Medium
PLLED Predator LED Large

STEP 2: LED Modules

4[1] 4 Modules
5[1] 5 Modules
6[1] 6 Modules
7[2] 7 Modules
8[2] 8 Modules
9[2] 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[9] 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
05 5′ cord length
06 6′ cord length
08 8′ cord length
10 10′ 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

DM[4] 0V-10V Dimmable driver
F1[9] Single fusing
F2[9] Double fusing
NL NEMA label
PCL1[3] DLL 120V-277V Photocontrol
PCL3[3] DLL 347V Photocontrol
PCL4[3] DLL 480V Photocontrol
PCSS[3] DSS 120-277V Photocontrol
P3[4] ANSI standard locking style receptacle that accepts 3 pin controls for on/off operation

STEP 12: Options (Continued)

P5[5,9] ANSI standard locking style 5-pin receptacle
P7[5,9] ANSI standard locking style 7-pin receptacle
SH[3] Shorting cap
TL Tool-less entry with latches

STEP 12: Accessories

PMLED FV-XX Full visor super durable paint with epoxy primer
PMLED UBV-XX Upper/bottom visor super durable paint with epoxy primer
PMLED VG Vandal guard
PMLED WG Wire guard
08657-XX[6] Yoke to 2.375″ OD tenon adaptor, super durable paint with epoxy primer
08775-XX[6] Yoke to 2.375″ OD tenon adaptor with photocontrol receptacle, super durable paint with epoxy primer

1. Available with PMLED only
2. Available with PLLED only
3. Must be used with P3 or P5
5. Not available with P5 option
4. Not available with P3 option
5. Available with mounting 3 and 4 only
7. PMLED Not Available with PMLEDF1, PMLEDF2
8. PMLED Not Available with TB option
9. Accepts 3-pin and 5-pin as well. The 5-pin controls fixture dimming.

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.

Replacement	HID Wattage CWA Type	Modules	Lumens	LED Wattage	LPW	Savings
PLLED 1000 HPS	1100	9 COB/10A	48,000	391	123	64%
PMLED 1000 MH	1070	6 COB/10A	32,000	261	123	75%
PMLED 750 MH	820	6 COB/10A	32,000	261	123	68%
PMLED 400 HPS	464	4 COB/10A	22,000	177	123	61%

PRECISION PARAGON
EFFICIENCY. ECONOMY. SUSTAINABILITY.

LLW

LED Low Profile Wrap

Product Information

Project Name	Type
Catalog Number	Date

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

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)

CERTIFICATION

C SA US DLC

ORDERING INFORMATION

EXAMPLE **LLW4-35ML-EU**

LLW – – **U** –

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
- **ESD** Bi-Level[1]
- **ED** 0-10V Dimming[2]

DRIVER VOLTAGE
- **U** Universal 120/277 VAC

OPTIONS
- **ELL14** Emergency Battery Backup[3]

MOUNTING ACCESSORIES (ORDER SEPARATELY)
- **S18** 18" Stem

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.

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PHOTOMETRIC DATA

PHOTOMETRIC DATA: LLW2-40LW-EU

All published luminaire photometric testing performed to IESNA LM-79-08 standards by a NVLAP certified lab.

Test: ITL79146
Test Date: 09/23/13

LUMINAIRE 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**
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**

AVG. LUMINANCE (Candela/Sq. M.)

Average Luminance Angle	0.0	22.5	45.0	67.5	90.0
0	8727	8727	8727	8727	8727
30	7785	7381	6945	6543	6414
40	6827	6305	5641	5062	4932
45	6037	5534	4834	4361	4250
50	5099	4616	4006	3722	3690
55	4170	3685	3239	3202	3198
60	3397	2930	2587	2794	2786
65	2656	2434	2174	2505	2440
70	2077	2161	1989	2325	2234
75	1754	1963	1939	2227	2138
80	1595	1837	1930	2213	2170
85	1284	1639	1877	2188	2242

ZONAL LUMEN SUMMARY

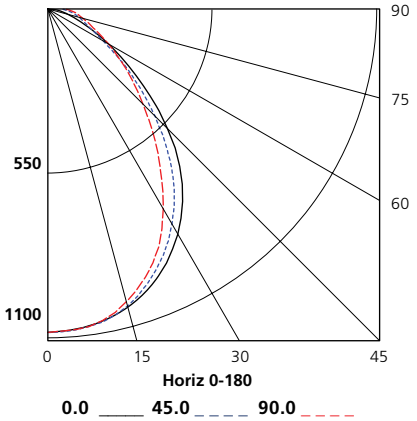
Zone	Lumens	%Lamp	%Fixt
0-30	808	33	33
0-40	1262	51	51
0-60	1931	79	79
0-90	2289	93	93

COEFFICIENTS OF UTILIZATION (%)

RCR	RC	80				70				50			0
	RW	70	50	30	10	70	50	30	10	50	30	10	0
	0	117	117	117	117	114	114	114	114	107	107	107	93
	1	109	103	99	96	104	100	97	94	95	92	89	79
	2	99	92	85	80	96	89	83	79	85	80	76	68
	3	91	82	74	68	88	80	73	67	76	70	65	59
	4	84	73	65	59	81	71	64	58	68	62	57	52
	5	78	66	58	52	75	65	57	51	62	55	50	46
	6	72	60	52	46	70	59	51	45	56	50	44	41
	7	67	55	47	41	65	54	46	41	52	45	40	36
	8	63	50	42	37	61	49	42	37	48	41	36	33
	9	59	46	39	34	57	46	38	33	44	37	33	30
	10	56	43	36	31	54	42	35	30	41	34	30	27

RCR = Room Cavity Ratio **RC** = Effective Ceiling Cavity Reflectance **RW** = Wall Reflectance

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.

Test: ITL79148
Test Date: 09/23/13

LUMINAIRE 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**
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**

AVG. LUMINANCE (Candela/Sq. M.)

Average Luminance Angle	0.0	22.5	45.0	67.5	90.0
0	8335	8335	8335	8335	8335
30	7587	7112	6697	6348	6203
40	6714	6148	5583	5031	4812
45	5897	5411	4827	4295	4098
50	4870	4480	3949	3635	3481
55	3924	3563	3148	3090	3011
60	3181	2858	2486	2669	2625
65	2392	2434	2079	2390	2283
70	1825	2204	1941	2223	2079
75	1678	2071	1921	2144	2002
80	1721	2011	1934	2147	2016
85	1616	1860	1943	2145	2086

ZONAL LUMEN SUMMARY

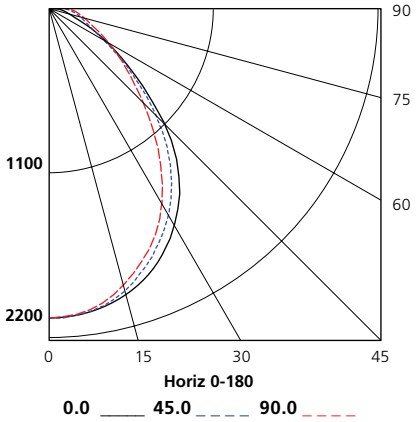
Zone	Lumens	%Lamp	%Fixt
0-30	1538	33	33
0-40	2414	51	51
0-60	3690	79	79
0-90	4359	93	93

COEFFICIENTS OF UTILIZATION (%)

RCR	RC	80				70				50			0
	RW	70	50	30	10	70	50	30	10	50	30	10	0
	0	117	117	117	117	114	114	114	114	107	107	107	93
	1	109	103	99	96	104	100	97	94	95	92	89	79
	2	99	92	85	80	96	89	83	79	85	80	76	68
	3	91	82	74	68	88	80	73	67	76	70	65	59
	4	84	73	65	59	81	71	64	58	68	62	57	52
	5	78	66	58	52	75	65	57	51	62	55	50	46
	6	72	60	52	46	70	59	51	45	56	50	44	41
	7	67	55	47	41	65	54	46	41	52	45	40	36
	8	63	50	42	37	61	49	42	37	48	41	36	33
	9	59	46	39	34	57	46	38	33	44	37	33	30
	10	56	43	36	31	54	42	35	30	41	34	30	27

RCR = Room Cavity Ratio **RC** = Effective Ceiling Cavity Reflectance **RW** = Wall Reflectance

INDOOR CANDELA PLOT



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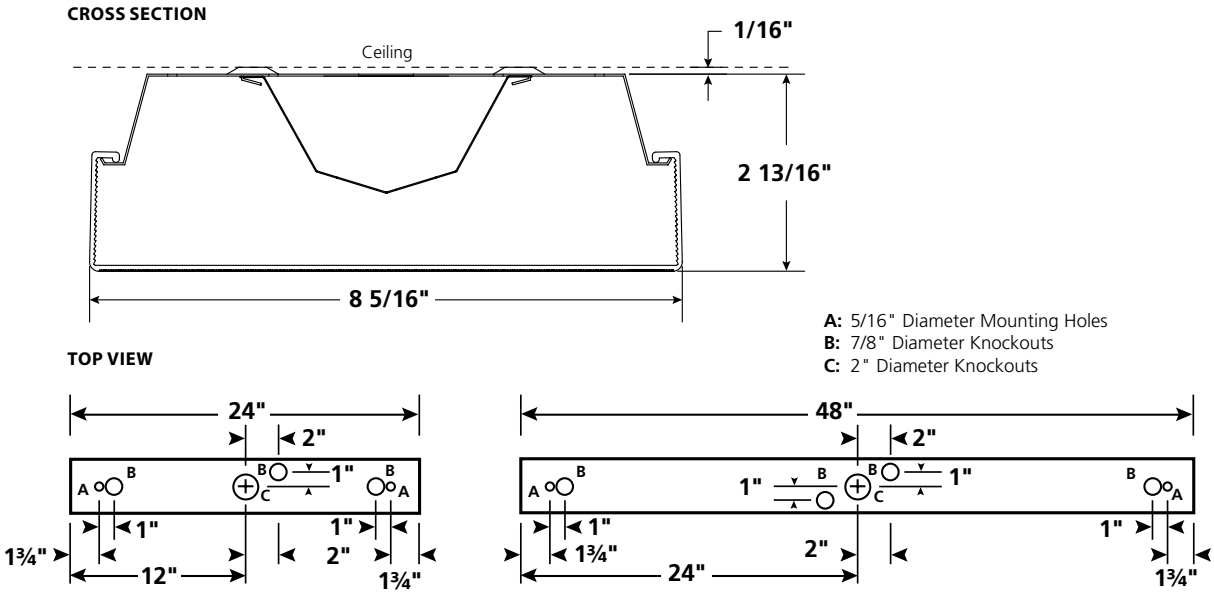
FIXTURE DIMENSIONS



*Drawings N.T.S.

LUMEN PACKAGE OPTIONS

		3500K DETAILS				4000K DETAILS			
Proposed System	CRI	CCT	Lumens Per Fixture	Input Watts	Lumens Per Watt	CCT	Lumens Per Fixture	Input Watts	Lumens Per Watt
LLW2-LW	>80	3500K	2367	25	96	4000K	2453	25	100
LLW2-ML	>80	3500K	4648	51	91	4000K	4739	52	91
LLW4-LW	>80	3500K	2409	25	98	4000K	2459	25	98
LLW4-ML	>80	3500K	4689	52	91	4000K	4873	52	94

*Lumen values shown are initial delivered lumens tested at 25°C per IES LM-79 standards.

OPERATING ENVIRONMENT

Proposed System	Min Temp	Max Temp
LLW-2-LW	-30°C/-22°F	40°C/104°F
LLW-2-ML	-30°C/-22°F	40°C/104°F
LLW-4-LW	-30°C/-22°F	40°C/104°F
LLW-4-ML	-30°C/-22°F	40°C/104°F

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.

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PKG-304-SL-DM

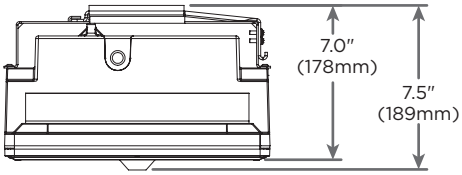
304 Series™ Parking Structure Luminaire – Sparkle Petroleum – Direct Mount

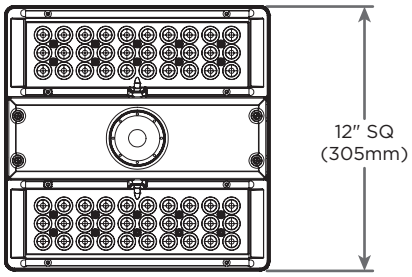
Product Description

Slim, low profile design. Lumianire 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 exisiting 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

PKG-304	SL	DM		E				
Product	**Optic**	**Mounting**	**LED Count (x10)**	**Series**	**Voltage**	**Color Options**	**Drive Current**	**Options**
PKG-304	**SL** Sparkle Petroleum	**DM** Direct Mount	**04** **06**	**E**	**UL** Universal 120–277V **UH** Universal 347–480V	**SV** Silver (Standard) **WH** White **BK** Black **BZ** Bronze **PB** Platinum Bronze	**700** 700mA (Standard) **525** 525mA **350** 350mA	**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**

† 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 is 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

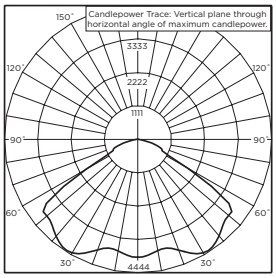
- **Input Voltage:** 120–277V or 347–480V, 50 / 60Hz, Class 1 drivers
- **Power Factor:** > 0.9 at full load
- **Total Harmonic Distortion:** < 20% at full load
- Integral 10kV surge suppression protection standard
- To address inrush current, slow blow fuse or type C / D breaker should be used

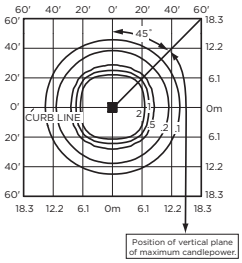
REGULATORY & VOLUNTARY QUALIFICATIONS

- 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 C62.41.2
- Luminaire and finish endurance tested to withstand 5,000 hours of elevated ambient salt fog conditions as defined in ASTM Standard B 117
- 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.





ITL Test Report #: 77415
CAN-304-SL-**-06-E-UL-700-40K
Initial Delivered Lumens: 12,707

PKG-304-SL-**-06-E-UL-700-40K
Mounting Height: 15′ (4.6m)
Initial Delivered Lumens: 12,760
Initial FC at grade

IES Files
To obtain an IES file specific to your project consult:
http://www.cree.com/lighting/tools-and-support/exterior-ies-configuration-tool

Lumen Output, Electrical, and Lumen Maintenance Data

Sparkle Petroleum Distribution												
LED Count (x10)	5700K		4000K		System Watts 120–480V	TOTAL CURRENT						50K Hours Projected Lumen Maintenance Factor*** @ 15˚C (59˚F)
	Initial Delivered Lumens*	BUG Ratings** Per TM-15-11	Initial Delivered Lumens*	BUG Ratings** Per TM-15-11		120V	208V	240V	277V	347V	480V	
350mA @ 25˚C (77˚F)												
04	5,243	B2 U0 G1	5,048	B2 U0 G1	46	0.39	0.24	0.22	0.21	0.15	0.12	94%
06	7,803	B3 U0 G1	7,514	B3 U0 G1	69	0.57	0.34	0.30	0.27	0.21	0.16	
525mA @ 25˚C (77˚F)												
04	7,340	B2 U0 G1	7,068	B2 U0 G1	71	0.59	0.35	0.31	0.28	0.21	0.16	93%
06	10,924	B3 U0 G1	10,519	B3 U0 G1	101	0.84	0.49	0.43	0.38	0.30	0.22	
700mA @ 25˚C (77˚F)												
04	8,912	B3 U0 G1	8,582	B3 U0 G1	94	0.79	0.46	0.40	0.36	0.28	0.21	91%
06	13,264	B3 U0 G1	12,773	B3 U0 G1	135	1.14	0.65	0.57	0.50	0.40	0.29	

* 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/Erratas/TM-15-11BugRatingsAddendum.pdf.
*** 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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PRECISION P2 PARAGON
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www.P-2.com

(714) 386-5550 CA
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(352) 692-5900 FL

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 - LED Vapor Tight

Application

VTL – 1x8 – ML – BL – UL – 40K – C8 – WH – LSP

VTL	1x8	ML	BL	UL	40K	C8	WH	LSP
Model	Fixt Size	Lumen Output	Driver Output	Voltage	Color Temp.	Cord Plug	Occ Sensor	Other

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 asistance.
(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)
PQC15 = 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

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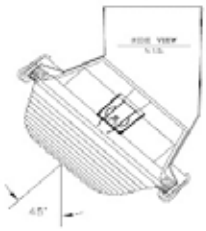
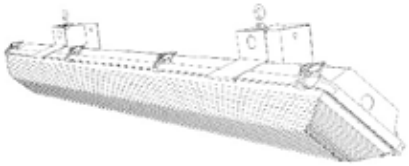
Fixture Construction

- Impact Resistant Fiberglass housing.
- Aluminum Gear Tray
- Frosted Linear Ribbed Diffuser
- Poured in place gasket.
- Class 2 Driver

VTL Mounted to 45° Mounting Brackets

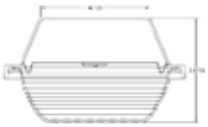




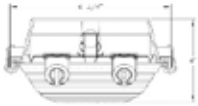
VTL Eye-Bolt Mounting with 45° Bracket
(Order Separately)

Want Fluorescent?

Consider our fluorescent VTG with long life lamps and PS ballast.



VTL VTG



Existing System

Existing Lamp / Ballast System	Lamp Quantity & Type		Mean Lumens Per Lamp	Mean Lumens Per Fixture	Ballast Factor	Approx. Fixture Efficiency	Delivered Lumens Per Fixture	Input Watts	Delivered Lumens Per Watt
2L40-T12 Mag	2	F40/T12/WM	2,280	4,560	0.88	0.75	3,010	72	42
1L96-T12 Mag	1	F96/T12/ES	4,750	4,750	0.88	0.75	3,135	76	41
2L96-T12 Mag	2	F96/T12/ES	4,750	9,500	0.88	0.75	6,270	126	50
1L96-T12HO Mag	1	F96/T12HO/ES	6,950	6,950	0.95	0.75	4,952	125	40
2L96-T12HO Mag	2	F96/T12HO/ES	6,950	13,900	0.93	0.75	9,695	210	46
2L32-T8-MP Elec	2	F32T8/841	2,800	5,600	0.87	0.75	3,654	53	69
2L32T8-HP Elec	2	F32T8/841	2,800	5,600	1.15	0.75	4,830	73	66

Re-Lighting Options

Proposed System	Light Source Quantity & Type		CRI	CCT	Driver Factor	Approx. Fixture Efficiency	Delivered Lumens Per Fixture	Input Watts	Delivered Lumens Per Watt
VTL-1X4-XL	1	1X4 XL Engine	>80	4000K	1.00	1.00	3,100	31	100
VTL-1X4-LW	1	1X4 LW Engine	>80	4000K	1.00	1.00	5,274	51	103
VTL-1X4-ML	1	1X4 ML Engine	>80	4000K	1.00	1.00	7,474	74	101
VTL-1X4-HL	1	1X4 HL Engine	>80	4000K	1.00	1.00	9,351	96	97
VTL-1X8-XL	1	1X8 XL Engine	>80	4000K	1.00	1.00	6,200	62	100
VTL-1X8-LW	1	1X8 LW Engine	>80	4000K	1.00	1.00	10,548	102	103
VTL-1X8-ML	1	1X8 ML Engine	>80	4000K	1.00	1.00	14,948	148	101
VTL-1X8-HL	1	1X8 HL Engine	>80	4000K	1.00	1.00	18,702	192	97

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 lumen output.
- 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.

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Notes
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(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)
PQC15 = 15' Cord/Quick Connect

Occupancy Sensor
WH = Wet Location 360 View Hi-Bay Sensor
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Other Options
VSB = VTL Surface/Hanging Bracket (3)
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5 YR Warranty | RoHS | 40°C Max | -40°C Min | Damp Location | DLC Pending | Lighting Facts Pending

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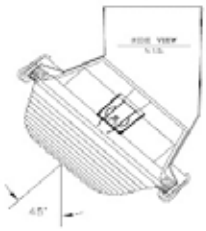

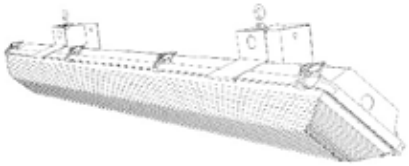

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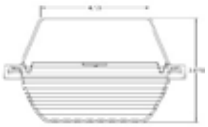
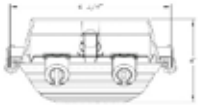


VTL VTG



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HDOT Phase 1

LIH – Lihue Airport
Solar Lighting Upgrades

Materials Cut Sheets

Prepared by

Johnson Controls Lighting Services

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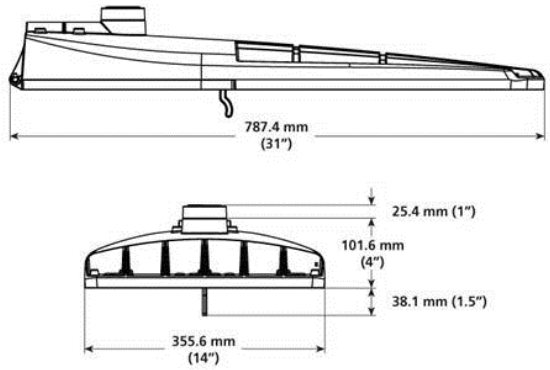
LIHUE AIRPORT - SOLAR	
PART NUMBER	**DESCRIPTION**
ATB2 40BLEDE70 120 R2 GY NR DCDRIVER & EG-340	Holophane Roadway LED luminaire, 120 volts, gray, Type II optics, 40B chips; w/ EG-340 Off Grid Solar LED
ATB2 40BLEDE70 120 R4 GY NR DCDRIVER & EG-340	Holophane Roadway LED luminaire, 120 volts, gray, Type IV optics, 40B chips; w/ EG-340 Off Grid Solar LED
ATB2 40BLEDE70 120 R5 GY NR DCDRIVER & EG-340	Holophane Roadway LED luminaire, 120 volts, gray, Type V optics, 40B chips; w/ EG-340 Off Grid Solar LED

PRODUCT OVERVIEW

Applications:

- Roadways
- Off ramps
- Residental streets
- Parking lots

DIMENSIONS



Effective Projected Area (EPA): The EPA for the ATB2 is .78 sq. ft.
Approx. Wt. = 21 lbs.

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. Acutal performance may differ as a result of end-user environment and application.

Autobahn Series ATB2

Roadway Lighting

ORDERING INFORMATION

Example: ATB2 40BLEDE70 MVOLT R2

Series

ATB2	Autobahn LED Roadway, Large

Performance Packages

40BLEDE53	40B Chips, 525 mA Driver
40BLEDE70	40B Chips, 700 mA Driver
40BLEDE10	40B Chips, 1000 mA Driver
60BLEDE53	60B Chips, 525 mA Driver
60BLEDE70	60B Chips, 700 mA Driver
60BLEDE10	60B Chips, 1000 mA Driver
80BLEDE53	80B Chips, 525 mA Driver
80BLEDE70	80B Chips, 700 mA Driver
80BLEDE10	80B Chips, 1000 mA Driver

Voltage

120	120V
MVOLT	Multi-volt, 120-277V
347	347V
480	480V

Optics

R2	Roadway Type II
R3	Roadway Type III
R4	Roadway Type IV
R5	Roadway Type V

Options

Color Temperature (CCT)

(blank)	4000K (standard)
5K	5000K

Mounting

(blank)	4-bolt Internal (standard)

Paint

(blank)	Gray (standard)
GI	Graphite
BK	Black
BZ	Bronze
DDB	Dark Bronze
WH	White
UP	Unpainted

Terminal Block

(blank)	Terminal Block (standard)
T2	Wired to L1 and L2 Position

Misc.

HS	House-Side Shield
BL	External Bubble
CR	Enhanced Corrosion Resistant Finish
NL	Nema Label

Controls

(blank)	NEMA Photocontrol Receptacle (standard)
NR	No Photocontrol Receptacle
PCSS	Solid State Lighting Photocontrol (120-277V)
SH	Shorting Cap
DE [1]	ROAM CONCIERGE Dimming Control (Not CSA certified at 347 and 480 volts)
VE [1]	ROAMVIEW Dimming control (Not CSA certified at 347 and 480 volts)
DM	DM 0V - 10V dimmable driver (controls provided by others)

Notes:

1 Specifies a ROAM dimming enabled fixture with a dimming control module factory installed. NEMA photocontrol receptacle required. Addtional hardware and services required ROAM deployment must be purchased seperately

Note: Specifications subject to change without notice. Acutal performance may differ as a result of end-user environment and application.

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American Electric Lighting
Acuity Brands Lighting, Inc.
3825 Columbus Rd, S.w.,Granville, OH 43023
Phone: 800-537-5710 Fax: 740-587-6114
www.americanelectriclighting.com

DESIGN DATA

Performance Package	Drive Current (mA)	Input Watts	Optic	4000K CCT	
				Delivered Lumens	Efficacy (LPW)
40B	525	69	R2	6680	97
	700	91		8772	96
	1000	140		11133	80
	525	69	R3	6803	99
	700	91		8972	98
	1000	140		12287	88
	525	69	R4	7034	102
	700	91		8888	98
	1000	140		11678	83
	525	69	R5	7062	102
	700	91		8918	98
	1000	140		11620	83
60B	525	100	R2	10014	100
	700	135		12790	95
	1000	213		17009	80
	525	100	R3	10260	103
	700	135		12950	96
	1000	213		17360	82
	525	100	R4	10407	104
	700	135		13156	97
	1000	213		17758	83
	525	100	R5	10000	100
	700	135		12825	95
	1000	213		17679	83
80B	525	137	R2	13145	96
	700	183		16504	90
	1000	280		22503	80
	525	137	R3	13302	97
	700	183		16778	92
	1000	280		22842	82
	525	137	R4	13757	100
	700	183		17290	94
	1000	280		23148	83
	525	137	R5	13152	96
	700	183		16470	90
	1000	280		23240	83

Note: Specifications subject to change without notice. Acutal performance may differ as a result of end-user environment and application.

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carmanah®
we put solar to work

EG300 SERIES

OFF-GRID SOLAR LED LIGHTING

Carmanah EG300-Series Off-Grid Solar LED Lighting System

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

REPRESENTED IN YOUR REGION BY:

Carmanah Technologies Corp. • Web: carmanah.com • Email: info@carmanah.com • Telephone: 1.250.380.0052 • Fax: 1.250.380.0062 •

EG300 SERIES

OFF-GRID SOLAR LED LIGHTING

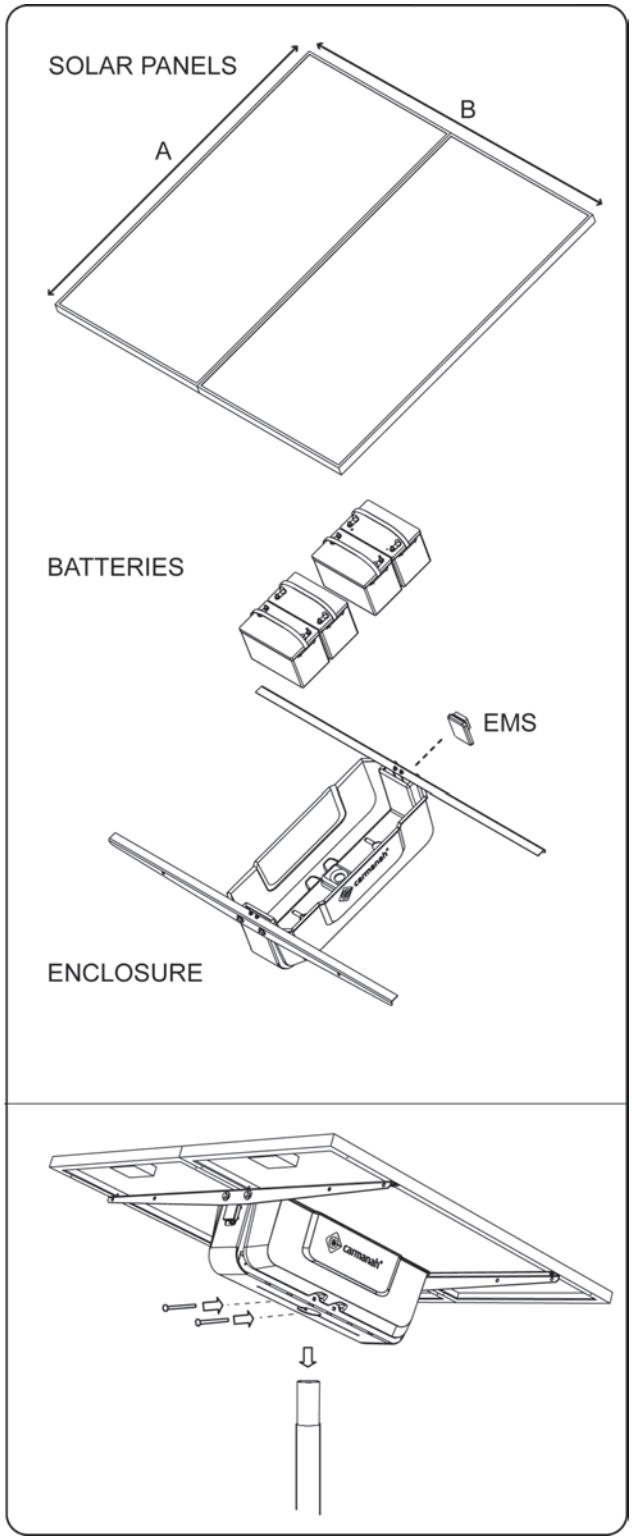
SOLAR ENGINE	EG320	EG340
EPA*	0.69 m² (7.45 ft²)	1.32 m² (14.17 ft²)
APA	0.53 m² (5.73 ft²)	1.01 m² (10.90 ft²)
Weight (without batteries)	39 kg (85 lb)	59 kg (130 lb)
Weight (with batteries)	95 kg (210 lb)	175 kg (385 lb)
Dimension A	157.5 cm (62 in)	157.5 cm (62 in)
Dimension B	82.6 cm (32.5 in)	165.2 cm (65 in)
Watts	>170	>340
BATTERIES		
Type	2 x group 27 absorbent glass mat (AGM)	4 x group 27 absorbent glass mat (AGM)
Rating	4,000 cycles to 20% depth of discharge at 20° C (68° F)	
FIXTURE		
LEDway™	20 – 120 LEDs single fix. 20 – 60 LEDs/fix. dual fix.	
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)		
Optional Operating Profiles	Dusk-to-Dawn Fixed Night, 6hr Fixed Night, 8hr	
	Split Night 5hr, 25%, 2hr Split Night 5hr, 25%, 4hr Split Night 7hr, 25%, 2hr Split Night 7hr, 25%, 4hr	
Day/night transitioning	Via solar panels	
Status Indicators	Day/night transition, battery connection, low/high voltage disconnect	
PHOTOMETRICS		
Fixture Efficacy	Up to 85 lumens/watt	
IES Light Distributions	Type II, Type III, Type IV, Type V, (backlight control available)	
Other	International Dark-Sky Association (IDA) approved, measured for performance using IESNA standards including IES BUG rating system	
Photometry	Certified photometry per IESNA LM-79-2008 & LM-80-2008	
Typical Applications	Streets, roadways, parking lots, general site lighting	

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		
CIE	M4 -M6	M2 - M4
Mexico	Secondary residential Type A roadways or lower	Primary and collector ways or higher
Brazil	A3, B, C1 – C3 (L, M)	A3, B, C1 – C3 (L, M, I)
Chile	M4 – M5, P3 – P6, C4 – C5	M2 – M4, P1 – P3, C2 – C4
Colombia	M4 - M5	M2 - M4
Peru	III - V	II - III
Venezuela	E	C-D
CERTIFICATIONS		
CE 2004-108-CE, EN 55015, EN 61547 for emissions and immunity		

* Effective Projected Area (EPA) calculated as the Actual Projected Area (APA) muliplied by a drag coefficient of 1.3. EPA of engine only: does not include fixture EPA.

** 3 second gust as per AASHTO 2001



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HDOT Phase 1

LIH – Lihue Airport
Exterior Lighting Upgrades

Materials Cut Sheets

Prepared by

Johnson Controls Lighting Services

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GE Lighting

72866 - F28T8/XLSPX41ECO

GE Ecolux® UltraMax™ Starcoat® T8

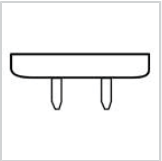
• Passes TCLP, which can lower disposal costs.

High Color Rendering
Energy Savings

Reduced Wattage

Photo
Not Available

Circle E



GENERAL CHARACTERISTICS

Lamp Type	Linear Fluorescent - Straight Linear
Bulb	T8
Base	Medium Bi-Pin (G13)
Rated Life	45000.0 hrs
Rated Life (instant start) @ Time	24000 h @ 3 h 34000 h @ 12 h
Rated Life (rapid start) @ Time	45000.0 @ 3.0/50000.0 @ 12.0 h
Bulb Material	Soda lime
Starting Temperature (MIN)	15.0 °C
LEED-EB MR Credit	26 picograms Hg per mean lumen hour
Additional Info	TCLP compliant
Primary Application	Energy Saving

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) Min @ 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

GE
Lighting

brighten

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**

When you Think LED lighting, Think GE.

ecomagination℠

imagination at work

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LED commercial indoor/outdoor PAR38 lamps

Directional Lamps (PAR)

Bulb Shape	Base Type	Watts	Order Code	Description	Volts	Case Qty**	MOL (In)	Lumens Initial	CBCP	Initial Color Temp	CRI	Wattage Equivalent	*Rated Life L70 (Hrs)	Dimmable	ENERGY STAR® Status	#Location Rating	Additional Information
Commercial PAR38 (Indoor/Outdoor)																	
PAR38	MED	12	66111	LED12DP38S830/12	120	6	5.31	700	10000	3000	82	70W	25,000	Yes	★	Damp	Spot, 12˚ beam, Silver
			66114	LED12DP38S827/12	120	6	5.31	660	10000	2700	82	70W	25,000	Yes	★	Damp	Spot, 12˚ beam, Silver
			90150	LED12DP382W83025	120	6	5.12	950	4400	3000	84	85W	25,000	Yes	★	Wet	Narrow Flood, 25˚ beam, White
			90151	LED12DP382W83035	120	6	5.12	950	2700	3000	84	85W	25,000	Yes	★	Wet	Flood, 35˚ beam, White
			90132	LED12DP382W82725	120	6	5.12	850	4000	2700	84	85W	25,000	Yes	★	Wet	Narrow Flood, 25˚ beam, White
			90133	LED12DP382W82735	120	6	5.12	850	2500	2700	84	85W	25,000	Yes	★	Wet	Flood, 35˚ beam, White
		18	90159	LED18DP38W830/25	120	6	5.12	1300	7600	3000	84	100W	25,000	Yes	★	Wet	Narrow Flood, 25˚ beam, White
			90160	LED18DP38W830/40	120	6	5.12	1300	2400	3000	84	100W	25,000	Yes	★	Wet	Flood, 40˚ beam, White
			90154	LED18DP38W827/25	120	6	5.12	1200	7000	2700	84	100W	25,000	Yes	★	Wet	Narrow Flood, 25˚ beam, White
			94453	LED18DP38W827/40	120	6	5.12	1200	2200	2700	84	100W	25,000	Yes	★	Wet	Flood, 40˚ beam, White
			90162	LED18DP38W840/25	120	6	5.12	1400	8200	4000	84	100W	25,000	Yes	★	Wet	Narrow Flood, 25˚ beam, White
			90163	LED18DP38W840/40	120	6	5.12	1400	2600	4000	84	100W	25,000	Yes	★	Wet	Flood, 40˚ beam, White
			22235	LED18DP38FL5K/TP	120	3	5.12	1500	3200	5000	84	100W	25,000	Yes	★	Wet	Flood, 40˚ beam, White
		20	68197	LED20DP38V827/12	120	6	5.1	1000	14000	2700	82	100W	25,000	Yes	★	Wet	Spot, 12˚ beam, Silver
			68200	LED20DP38V840/12	120	6	5.1	1200	17000	4000	82	100W	25,000	Yes	★	Wet	Spot, 12˚ beam, Silver
	MED	26	68183	LED26DP38S830/12	120	6	5.31	1500	24000	3000	82	130W	25,000	Yes	★	Wet	Spot, 12˚ beam, Silver
			68184	LED26DP38S830/25	120	6	5.31	1500	6800	3000	82	130W	25,000	Yes	★	Wet	Narrow Flood, 25˚ beam, Silver
			68185	LED26DP38S830/40	120	6	5.31	1500	3100	3000	82	120W	25,000	Yes	★	Wet	Flood, 40˚ beam, Silver
			68182	LED26DP38S840/40	120	6	5.31	1650	3200	4000	82	120W	25,000	Yes	★	Wet	Flood, 40˚ beam, Silver
			33647	LED26DP38S835/12	120	6	5.31	1900	31,000	3500	82	160W	25,000	Yes		Wet	Spot, 12˚ beam, Silver
			70591	LED26DP38S835/40	120	6	5.31	1900	4,000	3500	82	160W	25,000	Yes		Wet	Flood, 40˚ beam, Silver
			15139	LED28P38S830/15	120	6	5.31	2400	20,000	3000	82	130W	25,000	-		Dry	Spot, 15˚ beam, Silver

Get more information at

GELighting.com/ThinkLED

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* The life 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

ecomagination℠

Product is compliant with material restriction requirements of RoHS

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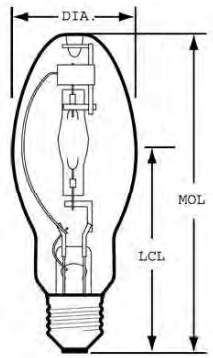
63555 (Rev 9/17/14)

GE Lighting

10361 - MXR50/U/MED

GE Multi-Vapor® PulseArc® Quartz Metal Halide BD17



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/urburns.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

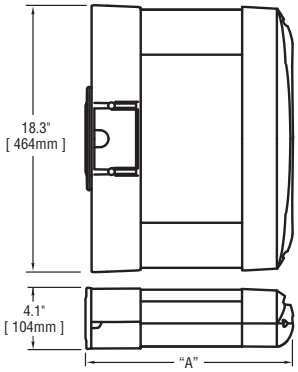
Wattage	50.0
Burn Position	Universal burning position
Warm Up Time to 90% (MIN)	2.0 min
Warm Up Time to 90% (MAX)	5.0 min
Hot Restart Time to 90% (MIN)	10.0 min
Hot Restart Time to 90% (MAX)	15.0 min

DIMENSIONS

Maximum Overall Length (MOL)	5.4300 in(137.9 mm)
Bulb Diameter (DIA)	2.125 in(54.0 mm)
Light Center Length (LCL)	3.430 in(87.1 mm)

PRODUCT INFORMATION

Product Code	10361
Description	MXR50/U/MED
ANSI Code	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 Package	6
UPC	043168103619



# of LEDs	Dim. "A"
20	11.91" [303mm]
40	11.91" [303mm]
60	13.91" [353mm]
80	15.91" [404mm]
100	17.91" [455mm]
120	19.91" [505mm]

Notes:

Product	Family	Optic	Mounting	# of LEDs (x 10)	LED Series	Voltage	Color Options	Drive Current Not Field Adjustable	Factory-Installed Options Please type additional options in manually on the lines provided above.
SEC	EDG	☐ 3M[1] ☐ 3MB[2]	WM[3]	☐ 02 ☐ 04 ☐ 06 ☐ 08 ☐ 10 ☐ 12	D	☐ UL Universal 120–277V ☐ UH Universal 347–480V ☐ 12 120V ☐ 24 240V ☐ 27 277V ☐ 34 347V	☐ SV Silver (Standard) ☐ BK Black ☐ BZ Bronze ☐ PB Platinum Bronze ☐ WH White	☐ 350 350mA ☐ 525[4] 525mA ☐ 700[5] 700mA	☐ 40K 4000K Color Temperature[6] ☐ DIM 0–10V Dimming[7,8,9] ☐ F Fuse[10,11,12] ☐ P Photocell[11,12] ☐ ML Multi-Level (75/525)[13]

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

# of LEDs	Initial Delivered Lumens – Type III Medium @ 5700K	B	U	G	Initial Delivered Lumens – Type III Medium with Backlight Control @ 5700K	B	U	G	Initial Delivered Lumens – Type III Medium @ 4000K	B	U	G	Initial Delivered Lumens – Type III Medium with Backlight Control @ 4000K	B	U	G	System Watts 120–480V	Total Current @ 120V	Total Current @ 240V	Total Current @ 277V	Total Current @ 347V	Total Current @ 480V	L_{70} Hours* @ 25° C (77° F)	50K Hours Lumen Maintenance Factor* @ 15° C (59° F)
		Rating**				Rating**				Rating**				Rating**										
350mA Fixture Operating at 25° C (77° F)																								
20	1,814 (02)	1	1	1	1,342 (02)	0	1	1	1,672 (02)	1	1	1	1,237 (02)	0	1	1	26	0.20	0.11	0.10	0.09	0.07	>150,000	93%
40	3,628 (04)	1	1	1	2,683 (04)	1	1	1	3,343 (04)	1	1	1	2,473 (04)	0	1	1	47	0.40	0.21	0.19	0.15	0.12	>150,000	
60	5,371 (06)	2	2	2	3,973 (06)	1	2	1	4,950 (06)	2	2	2	3,662 (06)	1	2	1	68	0.58	0.30	0.26	0.20	0.16	>150,000	
80	7,161 (08)	2	2	2	5,298 (08)	1	2	2	6,600 (08)	2	2	2	4,882 (08)	1	2	1	90	0.77	0.38	0.34	0.26	0.20	>150,000	
100	8,929 (10)	3	3	3	6,605 (10)	1	3	2	8,230 (10)	2	2	2	6,088 (10)	1	2	2	111	0.95	0.47	0.42	0.32	0.24	>150,000	
120	10,715 (12)	3	3	3	7,926 (12)	1	3	2	9,876 (12)	3	3	3	7,305 (12)	1	3	2	132	1.15	0.56	0.50	0.38	0.28	>150,000	
525mA Fixture Operating at 25° C (77° F)																								
20	2,539 (02)	1	1	1	1,878 (02)	0	1	1	2,340 (02)	1	1	1	1,731 (02)	0	1	1	37	0.31	0.17	0.16	0.12	0.10	136,000	92%
40	5,079 (04)	2	2	2	3,757 (04)	1	2	1	4,681 (04)	2	2	2	3,462 (04)	1	2	1	70	0.57	0.29	0.26	0.21	0.16	136,000	
60	7,520 (06)	2	2	2	5,562 (06)	1	2	2	6,930 (06)	2	2	2	5,127 (06)	1	2	1	102	0.87	0.44	0.39	0.30	0.22	129,000	
80	10,026 (08)	3	3	3	7,417 (08)	1	3	2	9,240 (08)	3	3	3	6,835 (08)	1	3	2	133	1.14	0.56	0.49	0.39	0.29	129,000	
700mA Fixture Operating at 25° C (77° F)																								
20	3,102 (02)	1	1	1	2,281 (02)	0	1	1	2,858 (02)	1	1	1	2,102 (02)	0	1	1	50	0.42	0.22	0.20	0.15	0.12	111,000	90%
40	6,203 (04)	2	2	2	4,562 (04)	1	2	1	5,717 (04)	2	2	2	4,204 (04)	1	2	1	93	0.79	0.40	0.35	0.27	0.20	111,000	
60	9,185 (06)	3	3	3	6,754 (06)	1	3	2	8,465 (06)	2	3	2	6,225 (06)	1	2	2	137	1.18	0.59	0.51	0.39	0.29	111,000	

* For recommended lumen maintenance factor data see TD-13

** For more information on the IES BUG (Backlight-Uplight-Glare) Ratin visit www.iesna.org/PDF/Erratas/TM-15-07BugRatingsAddendum.pdf

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Made in the U.S.A. of U.S. and imported parts.
Meets Buy American requirements within the ARRA.

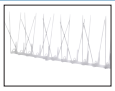
General Description

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

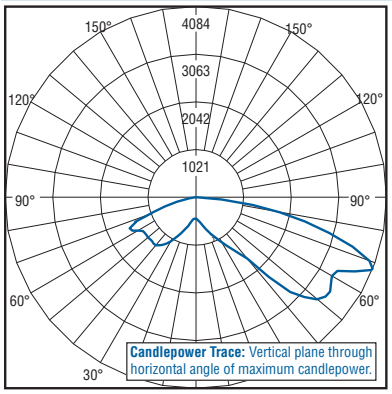
Modular design accommodates varied lighting output from high power, white, 5700K (+/- 500K per full fixture), minimum 70 CRI, long life LED sources. Optional 4000K (+/- 300K per full fixture) also available. 120–277V 50/60 Hz, Class 1 LED drivers are standard. 347–480V 50/60 Hz driver is optional. LED 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.

Field-Installed Accessories

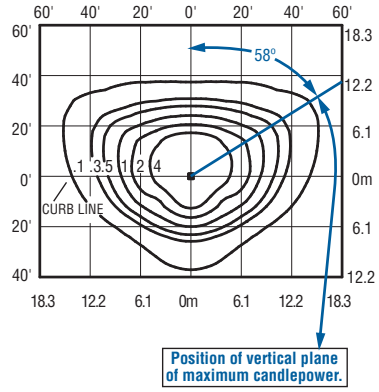


Bird Spikes
☐XA-BRDSPK

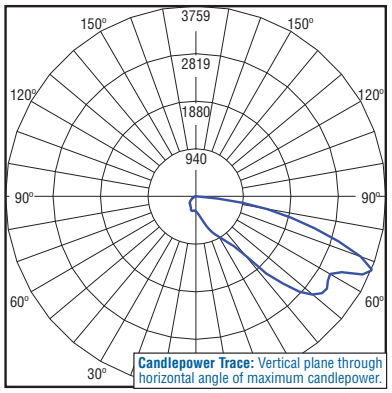
Photometrics



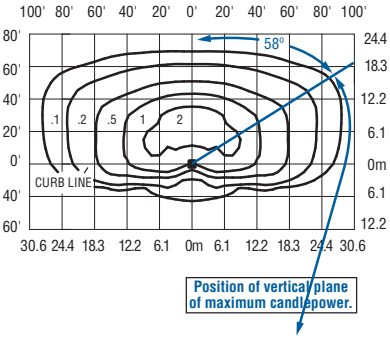
Independent Testing Laboratories certified test. Report No. ITL70203. Candlepower trace of 4000K, 60 LED Type III Medium security EDGE luminaire with 8,812 initial delivered lumens operating at 700mA. **All published luminaire photometric testing performed to IESNA LM-79-08 standards.**



Isofootcandle plot 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 4300K, 40 LED Type III Medium w/ backlight control area luminaire with 5,084 initial delivered lumens operating at 525mA. **All published luminaire photometric testing performed to IESNA LM-79-08 standards.**



Isofootcandle plot of 4000K, 80 LED Type III Medium area luminaire at 25' (7.6m) A.F.G. Luminaire with 6,835 initial delivered lumens operating at 525mA. Initial FC at grade.

Testing & Compliance

UL listed in the U.S. and Canada for wet locations and enclosure rsted 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.

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.

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Made in the U.S.A. of U.S. and imported parts.
Meets Buy American requirements within the ARRA.

304 Series™ PKG-304-5M-PD

Parking Structure Luminaire – Type V Medium – Pendant Mount

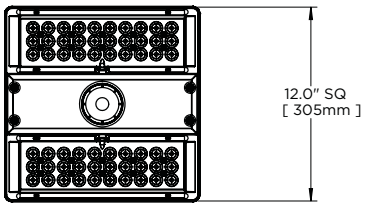
PKG-304-5M-PD-04-D-UL-SV-350-ML-40K

Product Description

Slim, low profile design. Lumianire 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
XA-PNDTLVL Leveler - for 0–13˚ sloped ceilings
XA-PS12KIT 12" (305mm) Pendant Kit Pendant height from ceiling surface to bottom of luminaire; mounting accessory surface boxes will add overall height
XA-PS18KIT 18" (457mm) Pendant Kit Pendant height from ceiling surface to bottom luminaire; mounting accessory or surface boxes will add overall height
XA-PS22KIT 22" (559mm) Pendant Kit Pendant height from ceiling surface to bottom luminaire; mounting accessory or surface boxes will add overall height
XA-PSFTG Pendant Fitting
XA-XCPBRDGRD Bird Guard

Ordering Information

Example: PKG-304-5M-PD-04-D-UL-SV-350-OPTIONS

PKG-304	5M	PD	04	D	UL	SV	350	ML-40K
Product	**Optic**	**Mounting**	**LED Count (x10)**	**Series**	**Voltage**	**Color Options**	**Drive Current**	**Options**
PKG-304	**5M** Type V Medium	**PD** Pendant Mount	**04** **06**	**D**	**UL** Universal 120–277V **UH** Universal 347–480V	**SV** Silver (Standard) **WH** White **BK** Black **BZ** Bronze **PB** Platinum Bronze	**700** 700mA (Standard) **525** 525mA **350** 350mA	**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

† See www.cree.com/lighting for warranty terms.

Rev. Date 11/08/2012

www.cree.com/lighting T (800) 236-6800 F (262) 504-5415

Product Specifications

CONSTRUCTION & MATERIALS

- Slim, low profile design
- Constructed from rugged die cast and extruded aluminum components
- LED driver is mounted is 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

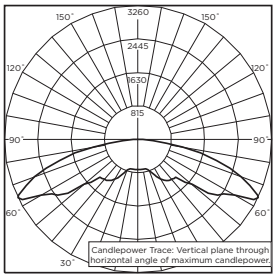
REGULATORY & VOLUNTARY QUALIFICATIONS

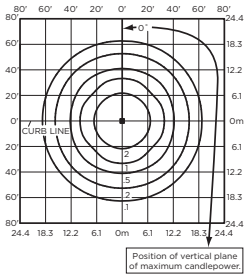
- cULus Listed
- Suitable for wet locations
- Enclosure rated IP66 per IEC 60529 when ordered without ML options
- Consult factory for CE Certified products
- 10kV surge suppression protection tested in accordance with IEEE/ANSI C62.41.2
- Luminaire and finish endurance tested to withstand 5,000 hours 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

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 Independent Testing Laboratories, a NVLAP certified laboratory.





ITL Test Report #: 66638
CAN-304-5M-**-06-D-UL-700
Initial Delivered Lumens: 10,893

CAN-304-5M-**-06-D-UL-700
Mounting Height: 15′ (4.6m)
Initial Delivered Lumens: 10,384
Initial FC at grade

Lumen Output, Electrical, and Lumen Maintenance Data

Type V Medium Distribution												
LED Count (x10)	5700K		4000K		System Watts 120–480V	TOTAL CURRENT						50K Hours Projected Lumen Maintenance Factor** @ 15˚C (59˚F)
	Initial Delivered Lumens	BUG Ratings* Per TM-15-11	Initial Delivered Lumens	BUG Ratings* Per TM-15-11		120V	208V	240V	277V	347V	480V	
350mA @ 25˚C (77˚F)												
04	4,113	B3 U0 G1	3,791	B2 U0 G1	47	0.39	0.24	0.21	0.19	0.15	0.11	94%
06	6,126	B3 U0 G2	5,646	B3 U0 G2	68	0.59	0.35	0.30	0.27	0.20	0.15	
525mA @ 25˚C (77˚F)												
04	5,758	B3 U0 G2	5,307	B3 U0 G2	68	0.58	0.34	0.30	0.27	0.21	0.16	93%
06	8,576	B3 U0 G2	7,904	B3 U0 G2	105	0.91	0.53	0.46	0.40	0.33	0.22	
700mA @ 25˚C (77˚F)												
04	6,992	B3 U0 G2	6,444	B3 U0 G2	94	0.81	0.47	0.41	0.36	0.28	0.20	91%
06	10,414	B4 U0 G2	9,598	B3 U0 G2	141	1.26	0.72	0.59	0.54	0.39	0.28	

* For more information on the IES BUG (Backlight-Uplight-Glare) Rating visit www.iesna.org/PDF/Erratas/TM-15-11BugRatingsAddendum.pdf
** Projected L_{70} (10K) Hours: >60,000. For recommended lumen maintenance factor data see TD-13

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304 Series™ PKG-304-PS-DM

Parking Structure Luminaire – Petroleum Symmetric – Direct Mount

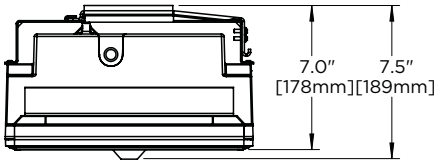
PKG-304-PS-DM-04-D-UL-SV-700-40K-ML

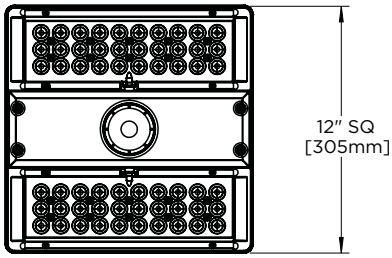
Product Description

Slim, low profile design. Lumianire 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 exisiting 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

PKG-304	PS	DM	04	D	UL	SV	700	40K-ML
Product	**Optic**	**Mounting**	**LED Count (x10)**	**Series**	**Voltage**	**Color Options**	**Drive Current**	**Options**
PKG-304	**PS** Petroleum Symmetric	**DM** Direct Mount	**04** **06**	**D**	**UL** Universal 120–277V **UH** Universal 347–480V	**SV** Silver (Standard) **WH** White **BK** Black **BZ** Bronze **PB** Platinum Bronze	**700** 700mA (Standard) **525** 525mA **350** 350mA	**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**

Rev. Date 11/08/2012

www.cree.com/lighting T (800) 236-6800 F (262) 504-5415

Product Specifications

CONSTRUCTION & MATERIALS

- Slim, low profile design
- Constructed from rugged die cast and extruded aluminum components
- LED driver is mounted is 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

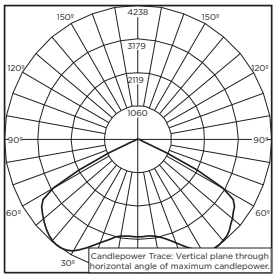
REGULATORY & VOLUNTARY QUALIFICATIONS

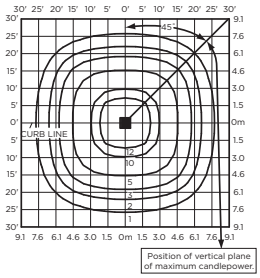
- cULus Listed
- Suitable for wet locations
- Enclosure rated IP66 per IEC 60529 when ordered without ML options
- Consult factory for CE Certified products
- 10kV surge suppression protection tested in accordance with IEEE/ANSI C62.41.2
- Luminaire and finish endurance tested to withstand 5,000 hours 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

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 Independent Testing Laboratories, a NVLAP certified laboratory.





ITL Test Report #: 66685
CAN-304-PS-**-06-D-UL-700
Initial Delivered Lumens: 12,214

CAN-304-PS-**-06-D-UL-700
Mounting Height: 15′ (4.6m)
Initial Delivered Lumens: 11,794
Initial FC at grade

Lumen Output, Electrical, and Lumen Maintenance Data

Petroleum Symmetric Distribution												
LED Count (x10)	5700K		4000K		System Watts 120–480V	TOTAL CURRENT						50K Hours Projected Lumen Maintenance Factor** @ 15˚C (59˚F)
	Initial Delivered Lumens	BUG Ratings* Per TM-15-11	Initial Delivered Lumens	BUG Ratings* Per TM-15-11		120V	208V	240V	277V	347V	480V	
350mA @ 25˚C (77˚F)												
04	4,671	B2 U0 G0	4,305	B2 U0 G0	47	0.39	0.24	0.21	0.19	0.15	0.11	94%
06	6,958	B2 U0 G0	6,413	B2 U0 G0	68	0.59	0.35	0.30	0.27	0.20	0.15	
525mA @ 25˚C (77˚F)												
04	6,540	B2 U0 G0	6,028	B2 U0 G0	68	0.58	0.34	0.30	0.27	0.21	0.16	93%
06	9,741	B3 U0 G0	8,977	B3 U0 G0	105	0.91	0.53	0.46	0.40	0.33	0.22	
700mA @ 25˚C (77˚F)												
04	7,942	B3 U0 G0	7,319	B3 U0 G0	94	0.81	0.47	0.41	0.36	0.28	0.20	91%
06	11,828	B3 U0 G0	10,902	B3 U0 G0	141	1.26	0.72	0.59	0.54	0.39	0.28	

* For more information on the IES BUG (Backlight-Uplight-Glare) Rating visit www.iesna.org/PDF/Erratas/TM-15-11BugRatingsAddendum.pdf
** Projected L_{70} (10K) Hours: >60,000. For recommended lumen maintenance factor data see TD-13

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304 Series™ PKG-304-5M-DM

Parking Structure Luminaire – Type V Medium – Direct Mount

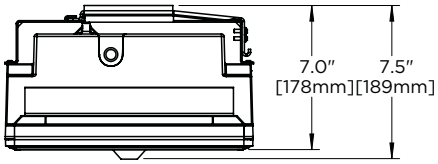
PKG-304-5M-DM-04-D-UL-SV-700-40K-ML

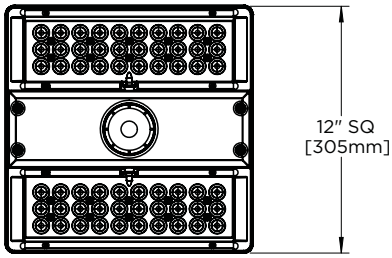
Product Description

Slim, low profile design. Lumianire 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 exisiting 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

PKG-304	5M	DM	04	D	UL	SV	700	40K-ML
Product	**Optic**	**Mounting**	**LED Count (x10)**	**Series**	**Voltage**	**Color Options**	**Drive Current**	**Options**
PKG-304	**5M** Type V Medium	**DM** Direct Mount	**04** **06**	**D**	**UL** Universal 120–277V **UH** Universal 347–480V	**SV** Silver (Standard) **WH** White **BK** Black **BZ** Bronze **PB** Platinum Bronze	**700** 700mA (Standard) **525** 525mA **350** 350mA	**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**

Rev. Date 11/08/2012

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Product Specifications

CONSTRUCTION & MATERIALS

- Slim, low profile design
- Constructed from rugged die cast and extruded aluminum components
- LED driver is mounted is 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

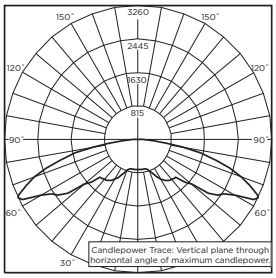
REGULATORY & VOLUNTARY QUALIFICATIONS

- 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

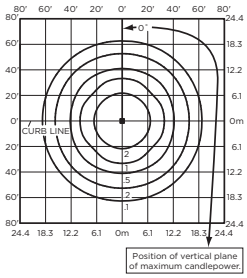
IES Files
To obtain an IES file specific to your project consult:
http://www.cree.com/lighting/tools-and-support/exterior-ies-configuration-tool

Photometry

All published luminaire photometric testing performed to IESNA LM-79-08 standards by Independent Testing Laboratories, a NVLAP certified laboratory.



ITL Test Report #: 66638
CAN-304-5M-**-06-D-UL-700
Initial Delivered Lumens: 10,893



CAN-304-5M-**-06-D-UL-700
Mounting Height: 15′ (4.6m)
Initial Delivered Lumens: 10,384
Initial FC at grade

Lumen Output, Electrical, and Lumen Maintenance Data

Type V Medium Distribution												
LED Count (x10)	5700K		4000K		System Watts 120–480V	TOTAL CURRENT						50K Hours Projected Lumen Maintenance Factor** @ 15˚C (59˚F)
	Initial Delivered Lumens	BUG Ratings* Per TM-15-11	Initial Delivered Lumens	BUG Ratings* Per TM-15-11		120V	208V	240V	277V	347V	480V	
350mA @ 25˚C (77˚F)												
04	4,113	B3 U0 G1	3,791	B2 U0 G1	47	0.39	0.24	0.21	0.19	0.15	0.11	94%
06	6,126	B3 U0 G2	5,646	B3 U0 G2	68	0.59	0.35	0.30	0.27	0.20	0.15	
525mA @ 25˚C (77˚F)												
04	5,758	B3 U0 G2	5,307	B3 U0 G2	68	0.58	0.34	0.30	0.27	0.21	0.16	93%
06	8,576	B3 U0 G2	7,904	B3 U0 G2	105	0.91	0.53	0.46	0.40	0.33	0.22	
700mA @ 25˚C (77˚F)												
04	6,992	B3 U0 G2	6,444	B3 U0 G2	94	0.81	0.47	0.41	0.36	0.28	0.20	91%
06	10,414	B4 U0 G2	9,598	B3 U0 G2	141	1.26	0.72	0.59	0.54	0.39	0.28	

* For more information on the IES BUG (Backlight-Uplight-Glare) Rating visit www.iesna.org/PDF/Erratas/TM-15-11BugRatingsAddendum.pdf
** Projected L_{70} (10K) Hours: >60,000. For recommended lumen maintenance factor data see TD-13

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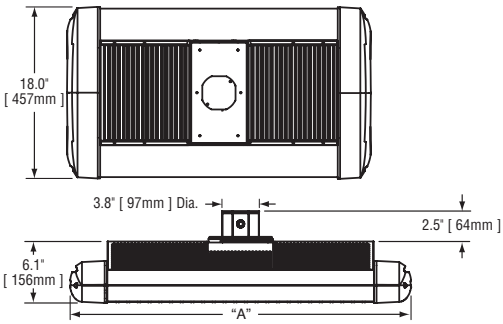
CAN-EDG-5M-DM THE EDGE® LED Canopy Light – Type V Medium

Rev. Date:9/22/11

Notes:



# of LEDs	Dim. "A"
40	16.06"
60	18.06"
80	16.06"
100	18.06"
120	20.06"
140	22.06"
160	24.06"
200	28.06"
240	32.06"

Product	Family	Optic	Mounting	# of LEDs (x 10)	LED Series	Voltage	Color Options	Drive Current Not Field Adjustable	Factory-Installed Options Please type additional options in manually on the lines provided above.
CAN	EDG	5M[1]	DM[2]	☐ 04[3] ☐ 06[4] ☐ 08 ☐ 10 ☐ 12 ☐ 14 ☐ 16 ☐ 20 ☐ 24	D	☐ UL Universal 120–277V ☐ UH Universal 347–480V ☐ 12 120V ☐ 24 240V ☐ 27 277V ☐ 34 347V	☐ SV Silver ☐ BK Black ☐ BZ Bronze ☐ PB Platinum Bronze ☐ WH White	☐ 350 350mA ☐ 525[5] 525mA ☐ 700[6] 700mA	☐ 43K 4300K Color Temperature[7] ☐ DIM 0–10V Dimming[8,9] ☐ F Fuse[10,11,12] ☐ HL Hi/Low (175/350/525, dual circuit input)[13] ☐ P Photocell[12,14,15] ☐ ML Multi-Level (75/525)[13]

Footnotes

1. Type V Medium distribution
2. Direct mount
3. Uses 80 LED size with two blanks in outside positions
4. Uses 100 LED size with two blanks in outside positions
5. Available on fixtures with 40–160 LEDs
6. Available on fixtures with 40–60 LEDs
7. Color temperature per luminaire; 6000K standard; minimum 70 CRI
8. Control by others
9. Refer to dimming spec sheet for availability and additional information
10. When code dictates fusing use time delay fuse
11. Not available when UH voltage is selected
12. Not available with all multi-level options. Refer to multi-level spec sheet for availability and additional information
13. Refer to multi-level spec sheet for availability and additional information
14. Must specify voltage other than UL or UH
15. 120 LED maximum when 34 voltage is selected

LED PERFORMANCE SPECS

# of LEDs	Initial Delivered Lumens – Type V Medium @ 6000K	B	U	G	Initial Delivered Lumens – Type V Medium @ 4300K	B	U	G	System Watts 120–480V	Total Current @ 120V	Total Current @ 230V	Total Current @ 277V	Total Current @ 347V	Total Current @ 480V	L_{70} Hours* @ 25° C (77° F)	50K Hours Lumen Maintenance Factor* @ 15° C (59° F)
		Rating**				Rating**										
350mA Fixture Operating at 25° C (77° F)																
40[3]	4,025 (04)	2	1	1	3,710 (04)	2	1	1	47	0.40	0.21	0.19	0.15	0.12	>150,000	93%
60[4]	5,960 (06)	3	2	1	5,493 (06)	3	2	1	68	0.58	0.30	0.26	0.20	0.16	>150,000	
80	7,946 (08)	3	2	2	7,324 (08)	3	2	2	90	0.77	0.38	0.34	0.26	0.20	>150,000	
100	9,908 (10)	4	3	2	9,131 (10)	3	3	2	111	0.95	0.47	0.42	0.32	0.24	>150,000	
120	11,889 (12)	4	3	2	10,958 (12)	4	3	2	132	1.15	0.56	0.50	0.38	0.28	>150,000	
140	13,808 (14)	4	3	2	12,726 (14)	4	3	2	157	1.34	0.67	0.61	0.47	0.35	149,000	
160	15,781 (16)	4	3	2	14,544 (16)	4	3	2	179	1.54	0.76	0.68	0.53	0.39	149,000	
200	19,726 (20)	4	3	2	18,180 (20)	4	3	2	221	1.92	0.95	0.84	0.65	0.48	149,000	
240	23,671 (24)	5	3	3	21,816 (24)	5	3	3	264	2.30	1.12	1.00	0.77	0.56	149,000	
525mA Fixture Operating at 25° C (77° F)																
40[3]	5,635 (04)	3	2	1	5,194 (04)	3	2	1	70	0.57	0.29	0.26	0.21	0.16	136,000	92%
60[4]	8,344 (06)	3	2	2	7,690 (06)	3	2	2	102	0.87	0.44	0.39	0.30	0.22	129,000	
80	11,125 (08)	4	3	2	10,253 (08)	4	3	2	133	1.14	0.56	0.49	0.39	0.29	129,000	
100	13,871 (10)	4	3	2	12,784 (10)	4	3	2	172	1.47	0.75	0.67	0.51	0.38	128,000	
120	16,645 (12)	4	3	2	15,341 (12)	4	3	2	204	1.76	0.88	0.78	0.60	0.44	128,000	
140	19,331 (14)	4	3	2	17,817 (14)	4	3	2	233	2.01	0.99	0.87	0.69	0.51	123,000	
160	22,092 (16)	5	3	3	20,362 (16)	5	3	3	265	2.29	1.11	0.98	0.78	0.57	123,000	
700mA Fixture Operating at 25° C (77° F)																
40[3]	6,883 (04)	3	2	1	6,344 (04)	3	2	1	93	0.79	0.40	0.35	0.27	0.20	111,000	90%
60[4]	10,191 (06)	4	3	2	9,393 (06)	3	3	2	137	1.18	0.59	0.51	0.39	0.29	111,000	

* 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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Made in the U.S.A. of U.S. and imported parts.
Meets Buy American requirements within the ARRA.

CAN-EDG-5M-DM THE EDGE® LED Canopy Light – Type V Medium

Rev. Date: 9/22/11

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

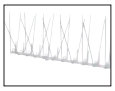
Exclusive Colorfast DeltaGuard® finish features an E-Coat epoxy primer with an ultra-durable silver powder topcoat, providing excellent resistance to corrosion, ultraviolet degradation and abrasion. Bronze, black, white and platinum bronze powder topcoats are also available. The finish is covered by 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.

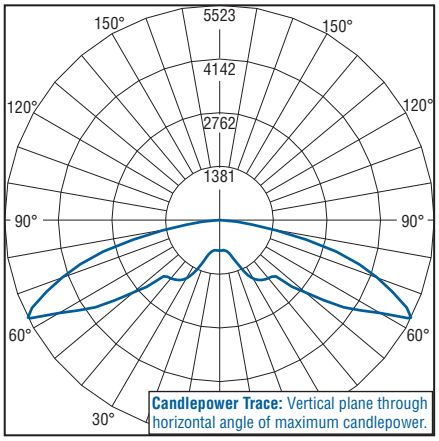
Field-Installed Accessories



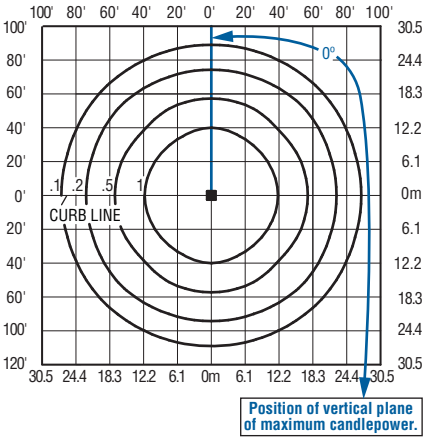
☐ **Bird Spikes**
XA-BRDSPK

☐ **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.**



Isofootcandle plot of 4300K, 120 LED Type V Medium canopy luminaire at 25' (7.6m) A.F.G. Luminaire with 15,341 initial delivered lumens operating at 525mA. Initial FC at grade.

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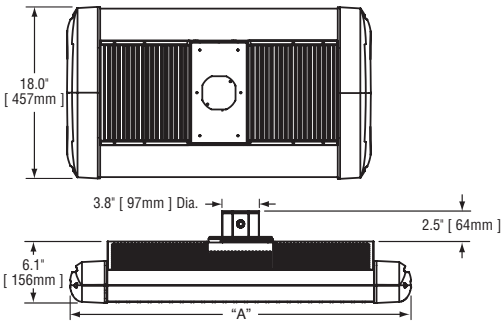
CAN-EDG-5S-DM THE EDGE® LED Canopy Light – Type V Short

Rev. Date:9/22/11

Notes:



# of LEDs	Dim. "A"
40	16.06"
60	18.06"
80	16.06"
100	18.06"
120	20.06"
140	22.06"
160	24.06"
200	28.06"
240	32.06"

Product	Family	Optic	Mounting	# of LEDs (x 10)	LED Series	Voltage	Color Options	Drive Current (Not Field Adjustable)	Factory-Installed Options (Please type additional options in manually on the lines provided above.)
CAN	EDG	5S[1]	DM[2]	☐ 04[3] ☐ 06[4] ☐ 08 ☐ 10 ☐ 12 ☐ 14 ☐ 16 ☐ 20 ☐ 24	D	☐ UL Universal 120–277V ☐ UH Universal 347–480V ☐ 12 120V ☐ 24 240V ☐ 27 277V ☐ 34 347V	☐ SV Silver ☐ BK Black ☐ BZ Bronze ☐ PB Platinum Bronze ☐ WH White	☐ 350 350mA ☐ 525[5] 525mA ☐ 700[6] 700mA	☐ 43K 4300K Color Temperature[7] ☐ DIM 0–10V Dimming[8,9] ☐ F Fuse[10,11,12] ☐ HL Hi/Low (175/350/525, dual circuit input)[13] ☐ P Photocell[12,14,15] ☐ ML Multi-Level (75/525)[13]

Footnotes

1. Type V Short distribution
2. Direct mount
3. Uses 80 LED size with two blanks in outside positions
4. Uses 100 LED size with two blanks in outside positions
5. Available on fixtures with 40–160 LEDs
6. Available on fixtures with 40–60 LEDs
7. Color temperature per luminaire; 6000K standard; minimum 70 CRI
8. Control by others
9. Refer to dimming spec sheet for availability and additional information
10. When code dictates fusing use time delay fuse
11. Not available when UH voltage is selected
12. Not available with all multi-level options. Refer to multi-level spec sheet for availability and additional information
13. Refer to multi-level spec sheet for availability and additional information
14. Must specify voltage other than UL or UH
15. 120 LED maximum when 34 voltage is selected

LED PERFORMANCE SPECS

# of LEDs	Initial Delivered Lumens – Type V Short @ 6000K	B	U	G (Rating**)	Initial Delivered Lumens – Type V Short @ 4300K	B	U	G (Rating**)	System Watts 120–480V	Total Current @ 120V	Total Current @ 240V	Total Current @ 277V	Total Current @ 347V	Total Current @ 480V	L_{70} Hours* @ 25° C (77° F)	50K Hours Lumen Maintenance Factor* @ 15° C (59° F)
350mA Fixture Operating at 25° C (77° F)																
40[3]	4,472 (04)	2	1	1	4,122 (04)	2	1	1	47	0.40	0.21	0.19	0.15	0.12	>150,000	93%
60[4]	6,622 (06)	3	1	1	6,103 (06)	3	1	1	68	0.58	0.30	0.26	0.20	0.16	>150,000	
80	8,829 (08)	3	1	1	8,137 (08)	3	1	1	90	0.77	0.38	0.34	0.26	0.20	>150,000	
100	11,009 (10)	3	1	2	10,146 (10)	3	1	2	111	0.95	0.47	0.42	0.32	0.24	>150,000	
120	13,210 (12)	4	1	2	12,175 (12)	3	1	2	132	1.15	0.56	0.50	0.38	0.28	>150,000	
140	15,342 (14)	4	1	2	14,140 (14)	4	1	2	157	1.34	0.67	0.61	0.47	0.35	149,000	
160	17,534 (16)	4	2	2	16,160 (16)	4	1	2	179	1.54	0.76	0.68	0.53	0.39	149,000	
200	21,918 (20)	4	2	2	20,200 (20)	4	2	2	221	1.92	0.95	0.84	0.65	0.48	149,000	
240	26,301 (24)	5	2	3	24,240 (24)	4	2	2	264	2.30	1.12	1.00	0.77	0.56	149,000	
525mA Fixture Operating at 25° C (77° F)																
40[3]	6,261 (04)	3	1	1	5,771 (04)	3	1	1	70	0.57	0.29	0.26	0.21	0.16	136,000	92%
60[4]	9,271 (06)	3	1	2	8,544 (06)	3	1	1	102	0.87	0.44	0.39	0.30	0.22	129,000	
80	12,361 (08)	4	2	2	11,392 (08)	3	1	2	133	1.14	0.56	0.49	0.39	0.29	129,000	
100	15,412 (10)	4	1	2	14,205 (10)	4	1	2	172	1.47	0.75	0.67	0.51	0.38	128,000	
120	18,495 (12)	4	2	2	17,045 (12)	4	1	2	204	1.76	0.88	0.78	0.60	0.44	128,000	
140	21,479 (14)	4	2	2	19,796 (14)	4	2	2	233	2.01	0.99	0.87	0.69	0.51	123,000	
160	24,548 (16)	4	2	2	22,624 (16)	4	2	2	265	2.29	1.11	0.98	0.78	0.57	123,000	
700mA Fixture Operating at 25° C (77° F)																
40[3]	7,648 (04)	3	1	1	7,048 (04)	3	1	1	93	0.79	0.40	0.35	0.27	0.20	111,000	90%
60[4]	11,323 (06)	3	1	2	10,436 (06)	3	1	2	137	1.18	0.59	0.51	0.39	0.29	111,000	

*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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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

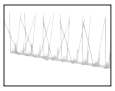
Exclusive Colorfast DeltaGuard® finish features an E-Coat epoxy primer with an ultra-durable silver powder topcoat, providing excellent resistance to corrosion, ultraviolet degradation and abrasion. Bronze, black, white and platinum bronze powder topcoats are also available. The finish is covered by our 10 year limited warranty.

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.

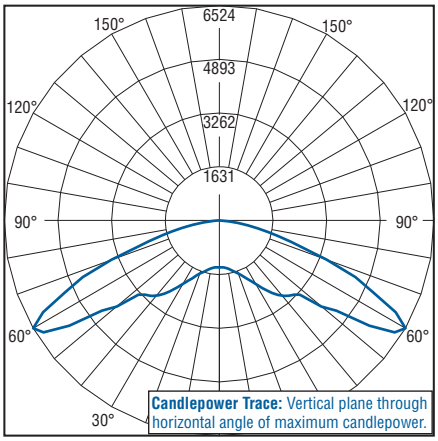
Field-Installed Accessories



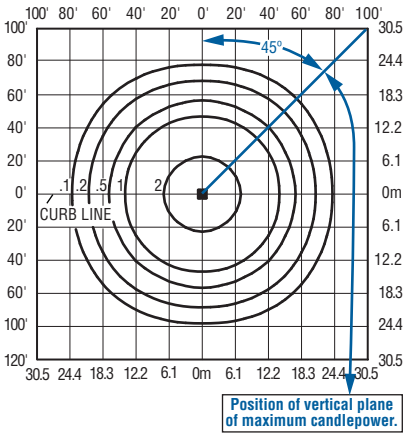
☐ **Bird Spikes**
XA-BRDSPK

☐ **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.

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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.

THE EDGE® FLD-EDG-70-AA

Flood Luminaire – 70˚ Flood – Adjustable Arm Mount

Product Description

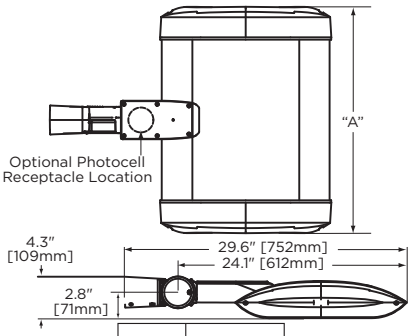
Slim, low profile design minimizes wind load requirements. Luminaire sides are rugged cast aluminum with integral, weather-tight LED driver compartments and high performance aluminum heat sinks. Adjustable arm mount is rugged die cast aluminum and mounts to 2" (51mm) IP (2.375" [60mm] O.D.) tenon. Includes 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
XA-BRDSPK Bird Spikes



LED Count (x10)	Dim. "A"
02	12.1" [306mm]
04	12.1" [306mm]
06	14.1" [357mm]
08	16.1" [408mm]
10	18.1" [459mm]
12	20.1" [510mm]
14	22.1" [560mm]
16	24.1" [611mm]
20	28.1" [713mm]
24	32.1" [814mm]

Ordering Information

Example: FLD-EDG-70-AA-02-D-UL-SV-350-OPTIONS

FLD-EDG	70	AA		D				
Product	**Optic**	**Mounting**	**LED Count (x10)**	**Version**	**Voltage**	**Color Options**	**Drive Current**	**Options**
FLD-EDG	**70** 70˚ Flood	**AA** Adjustable Arm	**02** **04** **06** **08** **10** **12** **14** **16** **20** **24**	**D**	**UL** Universal 120–277V **UH** Universal 347–480V **34** 347V	**SV** Silver (Standard) **BK** Black **BZ** Bronze **PB** Platinum Bronze **WH** White	**350** 350mA **525*** 525mA **700**** 700mA	**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 Hi/Low (175/350/525 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 - Must specify voltage other than UH **R NEMA Photocell Receptacle** - Not available with all ML options. Refer to ML spec sheet for availability with ML options - Intended for horizontal mounting - Photocell by others **ML Multi-Level** - Refer to ML spec sheet for details

* Available on luminaires with 20–160 LEDs
** Available on luminaires with 20–60 LEDs

Rev. Date: 8/14/2012

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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

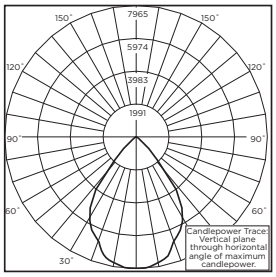
- cULus Listed
- Suitable for wet locations
- Enclosure rated IP66 per IEC 60529 when ordered without P or R options
- Consult factory for CE Certified products
- Certified to ANSI C136.31-2001, 3G bridge and overpass vibration standards
- 10kV surge suppression protection tested in accordance with IEEE/ANSI 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 the backlight control shield
- RoHS Compliant
- Meets Buy American requirements within ARRA

PATENTS

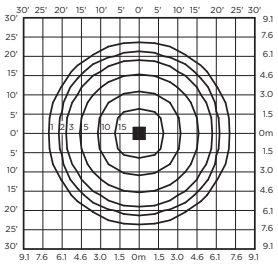
- Visit website for patents that cover these products: Patents http://www.cree.com/patents

Photometry

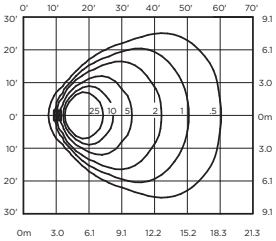
All published luminaire photometric testing performed to IESNA LM-79-08 standards by Independent Testing Laboratories, a NVLAP certified laboratory.



ITL Test Report #: 71844
FLD-EDG-70-**-06-D-UL-700-40K
Initial Delivered Lumens: 10,384



FLD-EDG-70-**-06-D-UL-700
Mounting Height: 20′ (6.1m) A.F.G.
Initial Delivered Lumens: 10,317
0˚ Tilt
Initial FC at grade



FLD-EDG-70-**-06-D-UL-700
Mounting Height: 10′ (3.0) A.F.G.
Initial Delivered Lumens: 10,317
60˚ Tilt
Initial FC at grade

IES Files
To obtain an IES file specific to your project consult:
http://www.cree.com/lighting/tools-and-support/exterior-ies-configuration-tool

Lumen Output, Electrical, and Lumen Maintenance Data

70˚ Flood Distribution										
LED Count (x10)	5700K Initial Delivered Lumens	4000K Initial Delivered Lumens	System Watts 120–480V	TOTAL CURRENT 120V	208V	240V	277V	347V	480V	50K Hours Projected Lumen Maintenance Factor @ 15˚C (59˚F)*
350mA @ 25˚C (77˚F)										
02	2,037	1,878	26	0.20	0.13	0.11	0.10	0.09	0.07	93%
04	4,075	3,755	47	0.40	0.24	0.21	0.19	0.15	0.12	
06	6,033	5,561	68	0.58	0.34	0.30	0.26	0.20	0.16	
08	8,044	7,414	90	0.77	0.44	0.38	0.34	0.26	0.20	
10	10,030	9,244	111	0.95	0.55	0.47	0.42	0.32	0.24	
12	12,036	11,093	132	1.15	0.66	0.56	0.50	0.38	0.28	
14	13,979	12,883	157	1.34	0.78	0.67	0.61	0.47	0.35	
16	15,975	14,724	179	1.54	0.89	0.76	0.68	0.53	0.39	
20	19,969	18,405	221	1.92	1.10	0.95	0.84	0.65	0.48	
24	23,963	22,086	264	2.30	1.31	1.12	1.00	0.77	0.56	
525mA @ 25˚C (77˚F)										
02	2,852	2,629	37	0.31	0.19	0.17	0.16	0.12	0.10	92%
04	5,705	5,258	70	0.57	0.33	0.29	0.26	0.21	0.16	
06	8,447	7,785	102	0.87	0.50	0.44	0.39	0.30	0.22	
08	11,262	10,380	133	1.14	0.65	0.56	0.49	0.39	0.29	
10	14,042	12,942	172	1.47	0.85	0.75	0.67	0.51	0.38	
12	16,851	15,530	204	1.76	1.01	0.88	0.78	0.60	0.44	
14	19,570	18,037	233	2.01	1.14	0.99	0.87	0.69	0.51	
16	22,366	20,613	265	2.29	1.29	1.11	0.98	0.78	0.57	
700mA @ 25˚C (77˚F)										
02	3,484	3,211	50	0.42	0.25	0.22	0.20	0.15	0.12	90%
04	6,968	6,422	93	0.79	0.45	0.40	0.35	0.27	0.20	
06	10,317	9,508	137	1.18	0.67	0.59	0.51	0.39	0.29	

* Projected L_{70} (10K) Hours: > 60,000. For recommended lumen maintenance factor data see TD-13

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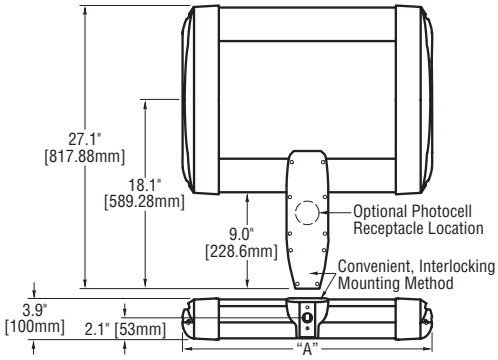
ARE-EDG-3M-DA THE EDGE® LED Area Light – Type III Medium

Rev. Date: 8/23/11

Reset

Notes:



# of LEDs	Dim. "A"
20	12.06" [306mm]
40	12.06" [306mm]
60	14.06" [357mm]
80	16.06" [408mm]
100	18.06" [459mm]
120	20.06" [510mm]
140	22.06" [560mm]
160	24.06" [611mm]
200	28.06" [713mm]
240	32.06" [814mm]

Product	Family	Optic	Mounting	# of LEDs (x 10)	LED Series	Voltage	Color Options	Drive Current (Not Field Adjustable)	Factory-Installed Options (Please type additional options in manually on the lines provided above.)
ARE	EDG	3M[1]	DA[3]	02	D	UL	SV	350	43K 4300K Color Temperature[6]
		3MB[2]		04		Universal	Silver	350mA	DIM 0–10V Dimming[7,8,9]
				06		120–277V	BK	525[4]	F Fuse[10,11,12]
				08		UH	Black	525mA	HL Hi/Low (175/350/525, dual circuit input)[13]
				10		Universal	BZ	700[5]	P Photocell[12,14]
				12		347–480V	Bronze	700mA	R NEMA Photocell Receptacle[12,15,16]
				14		34	PB		ML Multi-Level (75/525)[13]
				16		347V	Platinum		
				20			Bronze		
				24			WH		
							White		

Footnotes

1. IESNA Type III Medium distribution
2. IESNA Type III Medium distribution w/ backlight control
3. Direct mounting arm for use with 3–6" (76–152mm) square or round pole
4. Available on fixtures with 20–160 LEDs
5. Available on fixtures with 20–60 LEDs
6. Color temperature per fixture; 6000K 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 the multi-level spec sheet for availability and additional information
12. Refer to multi-level spec sheet for availability and additional information
13. Must specify voltage other than UH
14. Intended for horizontal mounting
15. Photocell by others

LED PERFORMANCE SPECS

# of LEDs	Initial Delivered Lumens – Type III Medium @ 6000K	B	U	G	Rating**	Initial Delivered Lumens – Type III Medium w/ backlight control @ 6000K	B	U	G	Rating**	Initial Delivered Lumens – Type III Medium @ 4300K	B	U	G	Rating**	Initial Delivered Lumens – Type III Medium w/ backlight control @ 4300K	B	U	G	Rating**	System Watts 120–480V	Total Current @ 120V	Total Current @ 240V	Total Current @ 277V	Total Current @ 347	Total Current @ 480V	L_{70} Hours* @ 25° C (77° F)	50K Hours Lumen Maintenance Factor* @ 15° C (59° F)
350mA Fixture Operating at 25° C (77° F)																												
20	1,814 (02)	1	1	1		1,342 (02)	0	1	1		1,672 (02)	1	1	1		1,237 (02)	0	1	1		26	0.20	0.11	0.10	0.09	0.07	>150,000	
40	3,628 (04)	1	1	1		2,683 (04)	1	1	1		3,343 (04)	1	1	1		2,473 (04)	0	1	1		47	0.40	0.21	0.19	0.15	0.12	>150,000	
60	5,371 (06)	2	2	2		3,973 (06)	1	2	1		4,950 (06)	2	2	2		3,662 (06)	1	2	1		68	0.58	0.30	0.26	0.20	0.16	>150,000	
80	7,161 (08)	2	2	2		5,298 (08)	1	2	2		6,600 (08)	2	2	2		4,882 (08)	1	2	1		90	0.77	0.38	0.34	0.26	0.20	>150,000	
100	8,929 (10)	3	3	3		6,605 (10)	1	3	2		8,230 (10)	2	2	2		6,088 (10)	1	2	2		111	0.95	0.47	0.42	0.32	0.24	>150,000	93%
120	10,715 (12)	3	3	3		7,926 (12)	1	3	2		9,876 (12)	3	3	3		7,305 (12)	1	3	2		132	1.15	0.56	0.50	0.38	0.28	>150,000	
140	12,444 (14)	3	3	3		9,205 (14)	1	3	2		11,469 (14)	3	3	3		8,484 (14)	1	3	2		157	1.34	0.67	0.61	0.47	0.35	149,000	
160	14,222 (16)	3	3	3		10,520 (16)	1	3	2		13,108 (16)	3	3	3		9,696 (16)	1	3	2		179	1.54	0.76	0.68	0.53	0.39	149,000	
200	17,778 (20)	3	3	3		13,151 (20)	2	3	3		16,385 (20)	3	3	3		12,120 (20)	1	3	2		221	1.92	0.95	0.84	0.65	0.48	149,000	
240	21,333 (24)	3	3	3		15,781 (22)	2	3	3		19,662 (24)	3	3	3		14,544 (24)	2	3	3		264	2.30	1.12	1.00	0.77	0.56	149,000	
525mA Fixture Operating at 25° C (77° F)																												
20	2,539 (02)	1	1	1		1,878 (02)	0	1	1		2,340 (02)	1	1	1		1,731 (02)	0	1	1		37	0.31	0.17	0.16	0.12	0.10	136,000	
40	5,079 (04)	2	2	2		3,757 (04)	1	2	1		4,681 (04)	2	2	2		3,462 (04)	1	2	1		70	0.57	0.29	0.26	0.21	0.16	136,000	
60	7,520 (06)	2	2	2		5,562 (06)	1	2	2		6,930 (06)	2	2	2		5,127 (06)	1	2	1		102	0.87	0.44	0.39	0.30	0.22	129,000	
80	10,026 (08)	3	3	3		7,417 (08)	1	3	2		9,240 (08)	3	3	3		6,835 (08)	1	3	2		133	1.14	0.56	0.49	0.39	0.29	129,000	
100	12,501 (10)	3	3	3		9,247 (10)	1	3	2		11,521 (10)	3	3	3		8,523 (10)	1	3	2		172	1.47	0.75	0.67	0.51	0.38	128,000	92%
120	15,001 (12)	3	3	3		11,097 (12)	1	3	2		13,826 (12)	3	3	3		10,227 (12)	1	3	2		204	1.76	0.88	0.78	0.60	0.44	128,000	
140	17,422 (14)	3	3	3		12,888 (14)	2	3	2		16,057 (14)	3	3	3		11,878 (14)	1	3	2		233	2.01	0.99	0.87	0.69	0.51	123,000	
160	19,911 (16)	3	3	3		14,729 (16)	2	3	2		18,351 (16)	3	3	3		13,575 (16)	2	3	3		265	2.29	1.11	0.98	0.78	0.57	123,000	
700mA Fixture Operating at 25° C (77° F)																												
20	3,102 (02)	1	1	1		2,281 (02)	0	1	1		2,858 (02)	1	1	1		2,102 (02)	0	1	1		50	0.42	0.22	0.20	0.15	0.12	111,000	
40	6,203 (04)	2	2	2		4,562 (04)	1	2	1		5,717 (04)	2	2	2		4,204 (04)	1	2	1		93	0.79	0.40	0.35	0.27	0.20	111,000	90%
60	9,185 (06)	3	3	3		6,754 (06)	1	3	2		8,465 (06)	2	3	2		6,225 (06)	1	2	2		137	1.18	0.59	0.51	0.39	0.29	111,000	

* 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.

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Made in the U.S.A. of U.S. and imported parts.
Meets Buy American requirements within the ARRA.

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 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. Integral weather-tight electrical box with terminal strips (12Ga - 20Ga) for easy power hook-up. 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 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.
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

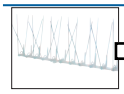
Exclusive Colorfast DeltaGuard® finish features an E-Coat epoxy primer with an ultra-durable silver powder topcoat, providing excellent resistance to corrosion, ultraviolet degradation and abrasion. Bronze, black, white and platinum bronze powder topcoats are also available. The finish is covered by our 10 year limited warranty.

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

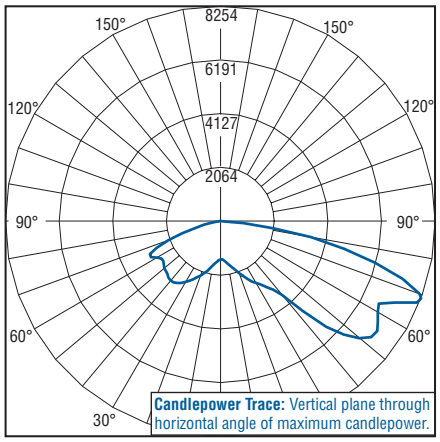
U.S. and international patents granted and pending. BetaLED is a division of Ruud Lighting, Inc. For a listing of Ruud Lighting, Inc. patents, visit www.uspto.gov.

Field-Installed Accessories

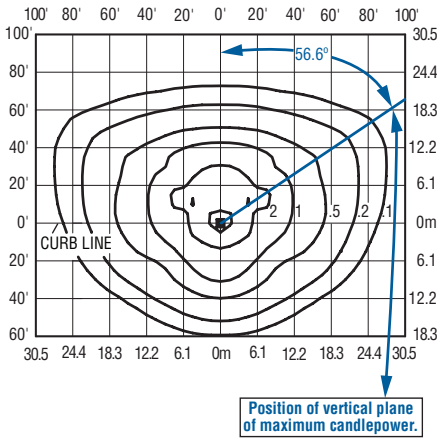


Bird Spikes
☐XA-BRDSPK

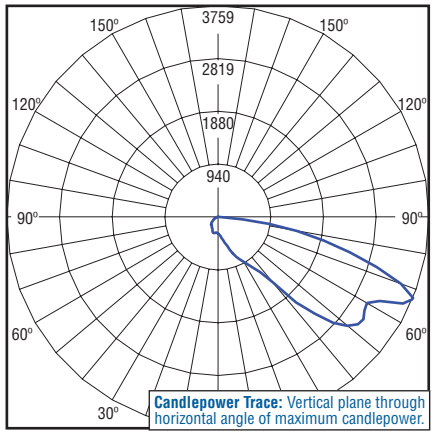
Photometrics



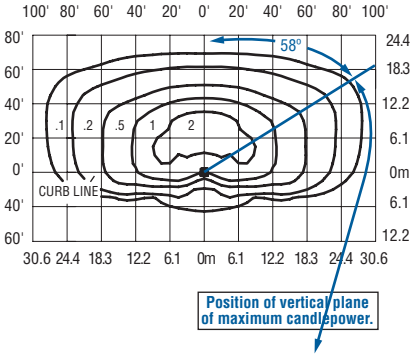
Independent Testing Laboratories certified test. Report No. ITL67871. Candlepower trace of 4300K, 160 LED Type III Medium area luminaire with 18,862 initial delivered lumens operating at 525mA. **All published luminaire photometric testing performed to IESNA LM-79-08 standards.**



Isofootcandle plot of 4300K, 120 LED Type III Medium area luminaire at 25' (7.6m) A.F.G. Luminaire with 13,826 initial delivered lumens operating at 525mA. Initial FC at grade.



Independent Testing Laboratories certified test. Report No. ITL68539. Candlepower trace of 4300K, 40 LED Type III Medium w/ backlight control area luminaire with 5,084 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 III Medium area luminaire at 25' (7.6m) A.F.G. Luminaire with 10,227 initial delivered lumens operating at 525mA. Initial FC at grade.

THE EDGE® EPA & Weight Calculations

# of LEDs	Approximate Weight 120–480V[1]	Single	2@ 180°	2@ 90°	3@ 90	4@ 90°
Fixed Arm Mount						
20	21.0 lbs. (9.5kg)	0.60	1.20	0.87	1.47	1.75
40	23.7 lbs. (10.8g)	0.60	1.20	0.87	1.47	1.75
60	27.0 lbs. (12.3kg)	0.60	1.20	0.92	1.51	1.83
80	28.1 lbs. (12.8kg)	0.60	1.20	0.96	1.55	1.91
100	32.3 lbs. (14.7kg)	0.60	1.20	1.00	1.60	2.00
120	33.5 lbs. (15.2kg)	0.60	1.20	1.04	1.64	2.08
140	36.9 lbs. (16.7kg)	0.60	1.20	1.08	1.68	2.16
160	41.4 lbs. (18.8kg)	0.60	1.20	1.12	1.72	2.24
200	43.3 lbs. (19.6kg)	0.61	1.21	n/a[2]	n/a[2]	n/a[2]
240	47.8 lbs. (21.7kg)	0.69	1.38	n/a[2]	n/a[2]	n/a[2]

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.

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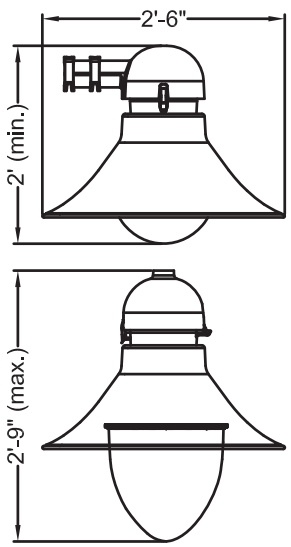
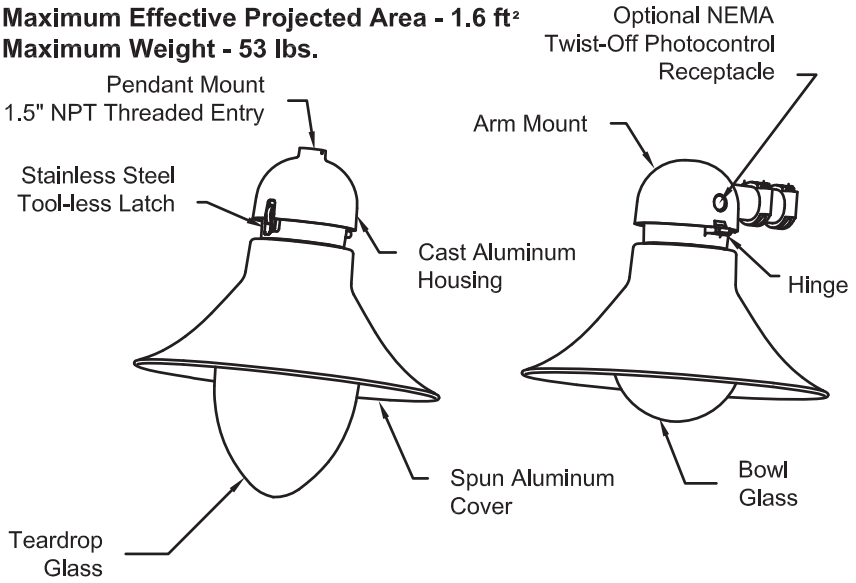
Made in the U.S.A. of U.S. and imported parts.
Meets Buy American requirements within the ARRA.



Maximum Effective Projected Area - 1.6 ft²
Maximum Weight - 53 lbs.



GlasWerks® LED Prague®

DESIGNER OUTDOOR

ORDERING INFORMATION:

GPLB 050 4K AS 2 B 3

COVER TYPE
GPLB = Prague

COLOR TEMP.
4K = 4000K
5K = 5000K
6K = 6000K

VOLTAGE
AS = AUTO-SENSING 120-277V
AH = AUTO-SENSING 347-480V

MOUNTING STYLE
1 = ARM
2 = PENDANT 1.5 NPT
3 = PENDANT 1.25 NPT

COLOR
A = AS SPECIFIED
B = BLACK
N = GREEN
Z = BRONZE
W - WHITE

SOURCE & WATTAGE
050 = 50W 350mA DRIVER
070 = 70W 350mA DRIVER
100 = 100W 350mA DRIVER

OPTICS
3 = 4173 ASYMMETRIC BOWL GLASS
4 = 4094 ASYMMETRIC TEARDROP GLASS (NOT AVAILABLE WITH 6K CCT)
5 = 4175 SYMMETRIC BOWL GLASS

HOLOPHANE® LEADER IN LIGHTING SOLUTIONS
An AcuityBrandsCompany

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THIS DRAWING, WHEN APPROVED, SHALL BECOME THE COMPLETE SPECIFICATION FOR THE MATERIAL TO BE FURNISHED BY HOLOPHANE ON THE ORDER NOTED ABOVE; A UNIT OF SIMILAR DESIGN MAY BE SUPPLIED, BUT ONLY AFTER APPROVAL BY THE CUSTOMER IN WRITING. DO NOT ELECTRICALLY ANCHOR BOLT TEMPLATE PRINT WILL BE REQUIRED WITH EACH ANCHOR BOLT ORDER. ANCHOR BOLTS WILL BE PROVIDED. THIS PRINT IS THE PROPERTY OF HOLOPHANE AND IS LOANED SUBJECT TO RETURN UPON DEMAND AND UPON EXPRESS CONDITION THAT IT WILL NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO OUR INTERESTS, AND ONLY IN CONNECTION WITH MATERIAL FURNISHED BY HOLOPHANE.

OPTIONS:
D = ROAM 0-10V DIMMING CONTROL
B = BI-LEVEL 0-10V DIMMING CONTROL
H = NEMA TWISTLOCK PHOTOCONTROL RECEPTACLE ONLY
DM = 0-10V DIMMING
PCS = DTL TWISTLOCK PHOTOCONTROL 120-277 VOLT
P34 = DTL TWISTLOCK PHOTOCONTROL 347V
P48 = DTL TWISTLOCK PHOTOCONTROL 480 VOLT
PSC = SHORTING CAP
L03 = 3 FEET OF PREWIRED LEADS
L10 = 10 FEET OF PREWIRED LEADS
L20 = 20 FEET OF PREWIRED LEADS
L25 = 25 FEET OF PREWIRED LEADS
L30 = 30 FEET OF PREWIRED LEADS

ACCESSORIES:
SPDPLUGIN = REPLACEMENT SURGE PROTECTOR 120-277V
SPDPLUGIN-48 = REPLACEMENT SURGE PROTECTOR 347-480V

ORDER #:
TYPE:
DRAWN: KRW
DATE: 10/25/11
DWG #: LUM_GPLB

Specifications

GENERAL DESCRIPTION
The Euro styled luminaire consists of a borosiliate glass optical assembly shielded 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 door 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, plugs 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
Limmited 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.

GlasWerks® LED
Prague®

DESIGNER
OUTDOOR

HOLOPHANE®
LEADER IN LIGHTING SOLUTIONS
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ORDER #:
TYPE:
DRAWN: KRW
DATE: 10/25/11
DWG #: LUM_GPLB

6" LED Open Downlight

RLF6LEDG4

120V–277V

0-10V Dimming

DATE: TYPE:

FIRM NAME:

PROJECT:

RETROFICIENT

ENERGY STAR

Ceiling Cutout: see guide
Maximum Ceiling Thickness 1½"
For conversion to millimeters, multiply inches by 25.4
Not to Scale

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:

High purity aluminum, Alzak, iridescence suppressed, semi-diffuse upper reflector. Self-trim standard. Painted white self-trim (WT) available as option. Reflector is made from anodized Alanod Miro 4 aluminum.

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:

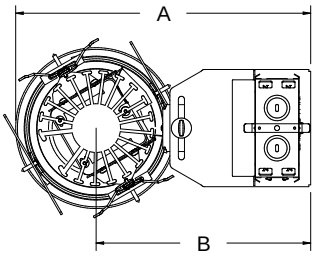
Comes standard with 0-10V dimming capability. Flicker-free dimming to 10%. 0-10V control may consume up to 1mA. 0-10V, Lutron 2 wire, 3 wire, and EcoSystem dimming available to 1%.

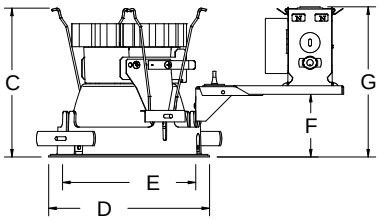
CERTIFICATIONS:

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.





*Dimensions shown are for range of adjustability.

	"A"*	"B"*	"C"*	"D"*	"E"*	"F"*	"G"*
RLF6LEDG4 6LFLED5G4 RLF6LEDG4 6LFLED6G4 RLF6LEDG4 6LFLED7G4	12-3/4" - 15"	8-7/8" - 10-3/4"	6-3/4"	7"	5-3/4"	2-1/2" - 3-3/4"	6-1/4" - 7-1/2"

EXAMPLE: RLF6LEDG4 - 6LFLED5G430K
EXAMPLE: RLF6LED7G4120HDM-6LFLED7G435KWHWT

CATALOG NUMBER:

Order housing, reflector, and accessories separately

STANDARD 0-10V DIMMING

HOUSING/LED GENERATION	VOLTAGE	OPTIONS	TRIM	LED COLOR TEMP	REF. FINISH	LOWER REF. COLOR	REF. OPTIONS	ACCESSORIES
❑ **RLF6LEDG4** 6" High Efficacy LED Housing	❑ **Blank** 120V–277V	❑ **Blank** Standard 0-10V dimming to 10% ❑ **SD**[1] Small Diameter	❑ **6LFLED5G4** 1100 Lumen Module ❑ **6LFLED6G4** 1500 Lumen Module ❑ **6LFLED7G4** 2000 Lumen Module	❑ **30K** ❑ **35K** ❑ **40K**	❑ **Blank** Semi-Diffuse	❑ **Blank** Clear ❑ **CG** Champagne Gold ❑ **BL** Black ❑ **WE** Wheat ❑ **LW** Light Wheat ❑ **PW** Pewter ❑ **WH**[1] White Paint	❑ **WT** White Trim ❑ **WF** Wide Flange	❑ **LFSC6** 6" reflector screw cover ❑ **LiteGear** See page 3 for availability ❑ **RWD6** Retrofit wide diameter housing kit

ALTERNATIVE DIMMING TO 1%

Use with HDM/DM1/2DM dimming option: Match Housing to Trim Output

❑ **RLF6LED5G4** ❑ **RLF6LED6G4** ❑ **RLF6LED7G4**	❑ **120** ❑ **277**	❑ **HDM**[3] Lutron 3-wire Eco System to 1% ❑ **2DM**[3] Lutron 2-wire Leading Edge to 1% (120V only) ❑ **DM1**[3] 0-10V dimming to 1% ❑ **SD**[1] Small Diameter

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

prescolite

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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**

RTF-014

PHOTOMETRIC DATA

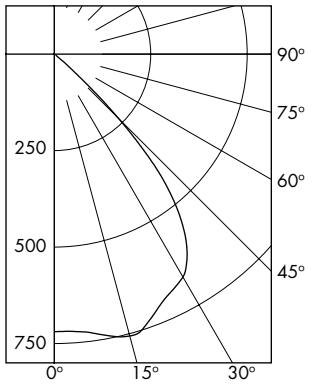
Retroficient - 6" RLF6LEDG4 Downlight

DRIVER DATA	RLF6LED5G4 30K	RLF6LED7G4 30K
Input Voltage	120-277V	120-277V
Input Frequency	50/60 Hz	50/60 Hz
Input Current	0.12A (120v)	0.22A (120v)
	0.052A (277v)	0.10A (277v)
Input Power	14.5W	26.5W
Constant Current Output	200–1000mA	200–1000mA
Power Factor	≥0.90	≥0.90
THD	<20%	<20%
EMI Filtering	FCC 47CFR	FCC 47CFR
	Part 15, Class A	Part 15, Class A
Operating Temperature	-20°C to 40°C	-20°C to 40°C
Dimming	0-10V	0-10V

Over-voltage, over-current, short-circuit protected

*Power consumption and photometric output may vary slightly with HDM or 2DM driver

RLF6LEDG4 6LFLED5G4 30K
LED Light Engine: 3000K, 80 CRI
System Wattage: 14.5W
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	

Test No. 8458
Tested at 25°C Ambient in accordance to IESNA LM-79-2008

ZONAL LUMEN SUMMARY

ZONE	LUMENS	%LUMINAIRE
0-30	602	52.0
0-40	967	83.6
0-60	1157	100.0
0-90	1157	100.0
90-180	0	0.0
0-180	1157	100.0

LUMINANCE DATA IN CANDELA/ SQ. METER

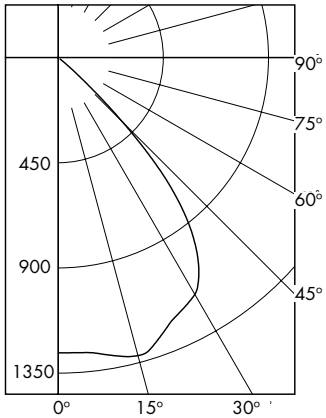
Angle in Vertical	Average
45°	18290
55°	382
65°	0
75°	0
85°	0

COEFFICIENTS OF UTILIZATION Zonal Cavity Method

Room Cavity Ratio	% Effective Ceiling Cavity Reflectance																	
	80%				70%				50%			30%			10%			
	20% Effective Floor Cavity Reflectance																	
	% Wall Reflectance																	
	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10
1	113	110	107	105	110	108	105	103	104	102	100	100	98	97	96	95	94
2	107	101	97	93	104	99	95	92	96	93	90	93	90	88	90	88	86
3	100	93	87	83	98	92	87	82	89	85	81	86	83	80	84	81	79
4	94	86	80	75	92	85	79	74	82	77	73	80	76	73	78	75	72
5	88	79	73	68	87	78	72	67	76	71	67	74	70	66	73	69	65
6	83	73	66	61	82	72	66	61	71	65	61	69	64	60	68	63	60
7	78	68	61	56	77	67	61	56	66	60	56	64	59	55	63	59	55
8	74	63	56	51	72	62	56	51	61	55	51	60	55	51	59	54	51
9	69	58	52	47	68	58	52	47	57	51	47	56	51	47	55	50	47
10	65	55	48	44	64	54	48	44	53	47	43	52	47	43	52	47	43

RLF6LEDG4 6LFLED5G4 30K Test No. 8458

RLF6LEDG4 6LFLED7G4 30K
LED Light Engine: 3000K, 80 CRI
System Wattage: 26.4W
Fixture Delivered Lumens: 2013
Fixture Efficacy: 76.1
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	

Test No. 8459
Tested at 25°C Ambient in accordance to IESNA LM-79-2008

ZONAL LUMEN SUMMARY

ZONE	LUMENS	%LUMINAIRE
0-30	1053	52.3
0-40	1690	83.9
0-60	2011	99.9
0-90	2013	100.0
90-180	0	0.0
0-180	2013	100.0

LUMINANCE DATA IN CANDELA/ SQ. METER

Angle in Vertical	Average
45°	30302
55°	860
65°	259
75°	0
85°	0

COEFFICIENTS OF UTILIZATION Zonal Cavity Method

Room Cavity Ratio	% Effective Ceiling Cavity Reflectance																	
	80%				70%				50%			30%			10%			
	20% Effective Floor Cavity Reflectance																	
	% Wall Reflectance																	
	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10
1	113	110	107	105	110	108	105	103	104	102	100	100	98	97	96	95	94
2	107	101	97	93	104	99	95	92	96	93	90	93	90	88	90	88	86
3	100	93	88	83	98	92	87	82	89	85	81	86	83	80	84	81	79
4	94	86	80	75	92	85	79	74	82	77	73	80	76	73	78	75	72
5	89	79	73	68	87	78	72	67	76	71	67	75	70	66	73	69	66
6	83	73	66	62	82	72	66	61	71	65	61	69	64	60	68	63	60
7	78	68	61	56	77	67	61	56	66	60	56	64	59	55	63	59	55
8	74	63	56	52	72	62	56	51	61	55	51	60	55	51	59	54	51
9	69	59	52	47	68	58	52	47	57	51	47	56	51	47	55	50	47
10	66	55	48	44	64	54	48	44	53	48	44	52	47	43	52	47	43

RLF6LEDG4 6LFLED7G4 30K Test No. 8459

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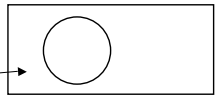
Housing Compatibility Guide		
Ordering Guidelines	6 inch	
	min	max
Requires SD Housing Option	5-15/16	6-1/8
All Standard Housings	6-1/8	6-1/2
Requires RWD Kit Accessory & WF Reflector Option	6-1/2	6-7/8

Dimensions shown are for the diameter of the frame flange at it's 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/

Dimming Compatibility Table

Dimming Ballast	Manufacturer	Web Link
DM/DM1	Lutron DVTV	http://bit.ly/11jSvZg
DM/DM1	Leviton AWRMG-7xx, AWSMG-7xx, AWSMT-7xx	http://bit.ly/1BJn2R9
HDM	Lutron	http://bit.ly/1vtjHAl
2DM	Lutron	http://bit.ly/1nF4Zp1

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HDOT Phase 2

LIH – Lihue Airport

Proposed Exterior Lighting Upgrades

Materials Cut Sheets

Prepared by

Johnson Controls Lighting Services

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PHILIPS

LED

InstantFit Lamps

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 ballasts[1]
- Fits into existing linear fixtures
- Eliminates the need for rewiring and allows the fixture to maintain original UL and CSA compliance[2]

Energy savings

- 50% energy savings vs F32T8 electronic instant start systems[3]

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 warranty[4]

Footnotes on the page 3.

Philips InstantFit LED T8 Lamps

Ordering, Electrical and Technical Data (Subject to change without notice)

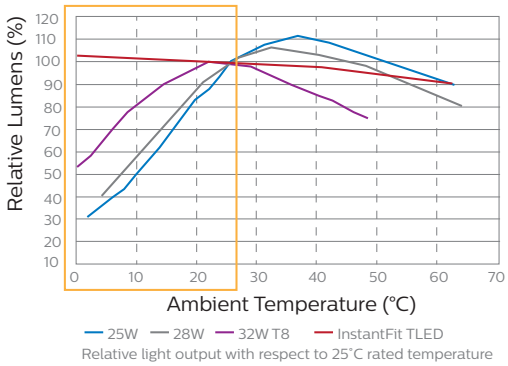
Product No.	Model No.	Ordering Code	Volts (Depending on Ballast)	Base	CRI	Color Temp. (K)	Pkg Qty	Rated Avg. Life[5]	MOL (In.)	Beam Angle
LED InstantFit T8 - 4'										
45358-9	9290011239	12T8/48-3000 IF 10/1	120-277, 347	G13	82	3000	10	50,000	48	160°
45359-7	9290011240	12T8/48-3500 IF 10/1	120-277, 347	G13	82	3500	10	50,000	48	160°
45360-5	9290011241	12T8/48-4000 IF 10/1	120-277, 347	G13	82	4000	10	50,000	48	160°
45361-3	9290011242	12T8/48-5000 IF 10/1	120-277, 347	G13	82	5000	10	50,000	48	160°
LED InstantFit T8 - 4' Dimmable[1] High Output										
45689-7	9290011585	15T8/48-3000 IF DIM 10/1	120-277, 347	G13	82	3000	10	50,000	48	160°
45690-5	9290011586	15T8/48-3500 IF DIM 10/1	120-277, 347	G13	82	3500	10	50,000	48	160°
45691-3	9290011587	15T8/48-4000 IF DIM 10/1	120-277, 347	G13	82	4000	10	50,000	48	160°
45692-1	9290011588	15T8/48-5000 IF DIM 10/1	120-277, 347	G13	82	5000	10	50,000	48	160°
LED InstantFit T8 - 4' Ultra High Output										
46313-3	9290012267	16.5T8 LED/48-3500 IF 10/1 UHO	120-277, 347	G13	82	3500	10	70,000	48	160°
46314-1	9290012268	16.5T8 LED/48-4000 IF 10/1 UHO	120-277, 347	G13	82	4000	10	70,000	48	160°
46315-8	9290012269	16.5T8 LED/48-5000 IF 10/1 UHO	120-277, 347	G13	82	5000	10	70,000	48	160°
LED InstantFit T8 - 4' Glass										
45656-6	9290011511	17T8/48-4000 IFG 10/1	120-277, 347	G13	82	4000	10	36,000	48	240°
45657-4	9290011512	17T8/48-5000 IFG 10/1	120-277, 347	G13	82	5000	10	36,000	48	240°
LED InstantFit T8 - 3'										
45205-2	9290011183	10.5T8/36-3000 IF 10/1	120-277, 347	G13	82	3000	10	50,000	36	160°
45206-0	9290011184	10.5T8/36-3500 IF 10/1	120-277, 347	G13	82	3500	10	50,000	36	160°
45207-8	9290011185	10.5T8/36-4000 IF 10/1	120-277, 347	G13	82	4000	10	50,000	36	160°
45208-6	9290011186	10.5T8/36-5000 IF 10/1	120-277, 347	G13	82	5000	10	50,000	36	160°
LED InstantFit T8 - 2' High Output										
45201-1	9290011179	8.5T8/24-3000 IF 10/1	120-277, 347	G13	82	3000	10	50,000	24	160°
45202-9	9290011180	8.5T8/24-3500 IF 10/1	120-277, 347	G13	82	3500	10	50,000	24	160°
45203-7	9290011181	8.5T8/24-4000 IF 10/1	120-277, 347	G13	82	4000	10	50,000	24	160°
45204-5	9290011182	8.5T8/24-5000 IF 10/1	120-277, 347	G13	82	5000	10	50,000	24	160°
LED InstantFit T8 U-Bent - 6" High Output										
45266-4	9290011196	16.5T8/24-3000 IF-6U 10/1	120-277, 347	G13	82	3000	10	50,000	22.5	160°
45267-2	9290011197	16.5T8/24-3500 IF-6U 10/1	120-277, 347	G13	82	3500	10	50,000	22.5	160°
45268-0	9290011198	16.5T8/24-4000 IF-6U 10/1	120-277, 347	G13	82	4000	10	50,000	22.5	160°
45269-8	9290011199	16.5T8/24-5000 IF-6U 10/1	120-277, 347	G13	82	5000	10	50,000	22.5	160°
LED InstantFit 4-Pin long compact - 2' High Output										
45663-2	9290011513	16.5PL-LED/24-3000 IF 10/1	120-277	2G11	82	3000	10	40,000	22.5	160°
45664-0	9290011514	16.5PL-LED/24-3500 IF 10/1	120-277	2G11	82	3500	10	40,000	22.5	160°
45665-7	9290011515	16.5PL-LED/24-4000 IF 10/1	120-277	2G11	82	4000	10	40,000	22.5	160°

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 (Subject to change without notice)

Product No.	Bare Lamp Watts (W)	Average System Watts (W)			Initial Lumens[6]		
		Low Ballast Factor (0.78)	Normal Ballast Factor (0.88)	High Ballast Factor (1.18)	Low Ballast Factor (0.78)	Normal Ballast Factor (0.88)	High Ballast Factor (1.18)
LED InstantFit T8 - 4'							
45358-9	12	12.5	14.5	18.5	1300	1500	1700
45359-7	12	12.5	14.5	18.5	1300	1500	1800
45360-5	12	12.5	14.5	18.5	1400	1600	1850
45361-3	12	12.5	14.5	18.5	1450	1600	2000
LED InstantFit T8 - 4' Dimmable[1] High Output							
45689-7	15	16	18	26.5	1800	2000	2700
45690-5	15	16	18	26.5	1800	2000	2700
45691-3	15	16	18	26.5	1900	2100	2800
45692-1	15	16	18	26.5	1900	2100	2800
LED InstantFit T8 - 4' Ultra High Output							
46313-3	16.5	18	20	27	2200	2400	2950
46314-1	16.5	18	20	27	2250	2500	3050
46315-8	16.5	18	20	27	2250	2500	3050
LED InstantFit T8 - 4' Glass							
45656-6	17	18.0	20.0	26.5	1850	2100	2450
45657-4	17	18.0	20.0	26.5	1850	2100	2450
LED InstantFit T8 - 3'							
45205-2	10.5	12.5	13	17	1000	1100	1330
45206-0	10.5	12.5	13	17	1050	1160	1400
45207-8	10.5	12.5	13	17	1080	1200	1440
45208-6	10.5	12.5	13	17	1150	1270	1550
LED InstantFit T8 - 2' High Output							
45201-1	8.5	10	10.5	14.5	860	950	1110
45202-9	8.5	10	10.5	14.5	900	1040	1170
45203-7	8.5	10	10.5	14.5	930	1050	1200
45204-5	8.5	10	10.5	14.5	1000	1100	1290
LED InstantFit T8 U-Bent - 6" High Output							
45266-4	16.5	17.5	19	25.5	1800	2000	2700
45267-2	16.5	17.5	19	25.5	1800	2000	2700
45268-0	16.5	17.5	19	25.5	1900	2100	2800
45269-8	16.5	17.5	19	25.5	1950	2150	2900
LED InstantFit 4-Pin long compact (PL-L) - 2' High Output							
45663-2	17	N/A	21	N/A	N/A	1900	N/A
45664-0	17	N/A	21	N/A	N/A	2000	N/A
45665-7	17	N/A	21	N/A	N/A	2100	N/A

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. (2) 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 B50 L70 requirements with a ballast whose ballast factor is ≤ 0.88.
6. Photometric testing consistent with IES LM-79.

● This lamp is DLC qualified.

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.

	Reference Ballast	ICN-1P32-N	ICN-2P32-N	ICN-3P32-N	ICN-4P32-N
	Ballast Factor	0.88	0.88	0.88	0.88
	Number of Lamps	1	2	3	4

	Lamp Type	System Power (W)*			
Specification	F32T8	31	59	85	112
	InstantFit 12 W	12.5	27.5	40	58
	InstantFit 15 W	24	35.5	46	63

* 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

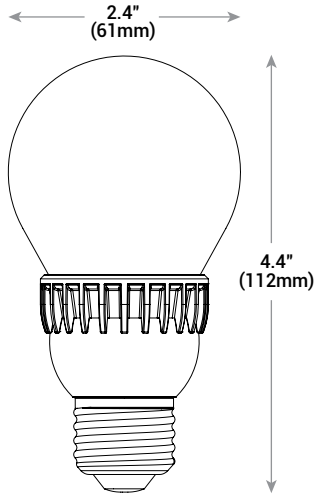
CCT: 2700K, 5000K*

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



Click below to select Quick Ship products

QUICKSHIP™ A19-60W-27K-B1

For full list of Cree Quick Ship products visit www.cree.com/lighting/quickship

Ordering Information

Example: A19-60W-27K-T24

A19						
Product	**Watt Equivalent**	**CCT**	**Voltage**	**Base**	**CRI**	**Packaging Options**
A19	**40W** 40 Watt (450 lumens) **60W** 60 Watt (800 lumens) **75W** 75 Watt (1100 lumens)	**27K** 2700 Kelvin **50K*** 5000 Kelvin	**Blank** 120 Volt	**Blank** E26 (screw base)	**Blank** 80 CRI	**B1** (6) Blister Pack bulbs in master carton (MC=6) **T24 - 40W & 60W Equivalent** (24) Tray Pack bulbs in master carton (Bulk Pack) **T12 - 75W Equivalent** (12) Tray Pack bulbs in master carton (Bulk Pack)

† 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

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 40W (27K): BA19-04527OMF-12DE26-2U100
  A19 60W (27K): BA19-08027OMF-12DE26-2U100
  A19 60W (50K): BA19-08050OMF-12DE26-2U100
  A19 75W (27K): BA19-11027OMF-12DE26-1U100
  A19 75W (50K): BA19-11050OMF-12DE26-1U100

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*	810048028092	40W Warm White A19 Equivalent	A19	6W	2700K	6	480	80	450	25,000
A19-60W-27K-B1*	810048028108	60W Warm White A19 Equivalent	A19	9.5W	2700K	6	480	80	800	25,000
A19-60W-50K-B1*	810048028115	60W Daylight A19 Equivalent	A19	9W	5000K	6	480	80	800	25,000
A19-75W-27K-B1*	849665001133	75W Warm White A19 Equivalent	A19	13.5W	2700K	6	480	80	1,100	25,000
A19-75W-50K-B1*	849665001140	75W Daylight A19 Equivalent	A19	13.5W	5000K	6	480	80	1,100	25,000
A19-40W-27K-T24	810048028283	40W Warm White A19 Equivalent	A19	6W	2700K	24	1,296	80	450	25,000
A19-60W-27K-T24	810048028290	60W Warm White A19 Equivalent	A19	9.5W	2700K	24	1,296	80	800	25,000
A19-60W-50K-T24	810048028306	60W Daylight A19 Equivalent	A19	9W	5000K	24	1,296	80	800	25,000
A19-75W-27K-T12	849665001171	75W Warm White A19 Equivalent	A19	13.5W	2700K	12	130	80	1,100	25,000
A19-75W-50K-T12	849665001188	75W Daylight A19 Equivalent	A19	13.5W	5000K	12	130	80	1,100	25,000

* Must be ordered in quantities of 6

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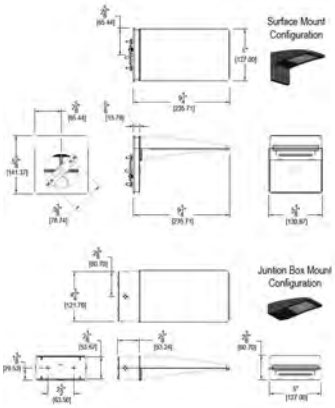
WPLED13N

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 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:
RAB's range of CCT (Correlated color temperature) follows the guidelines of the American National Standard for Specifications for the Chromaticity of Solid State Lighting (SSL) Products, ANSI C78.377-2008.

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.

Tech Help Line: 888 RAB-1000 **Email:** sales@rabweb.com **On the web at:** www.rabweb.com

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Note: Specifications are subject to change without notice

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.

Tech Help Line: 888 RAB-1000 **Email:** sales@rabweb.com **On the web at:** www.rabweb.com

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Note: Specifications are subject to change without notice

WPLED18N

Ultra-high efficiency LED 18W wallpack. Patent Pending thermal management system. 100,000 hour L70 lifespan. 5 Year Warranty.

Color: Bronze

Weight: 7.5 lbs

Project:	Type:
Prepared By:	Date:

Driver Info		LED Info	
Type:	Constant Current	Watts:	18W
120V:	0.17A	Color Temp:	4000K (Neutral)
208V:	0.11A	Color Accuracy:	84 CRI
240V:	0.09A	L70 Lifespan:	100,000
277V:	0.08A	Lumens:	1,655
Input Watts:	20W	Efficacy:	84 LPW
Efficiency:	91%		

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:

RAB's range of CCT (Correlated Color Temperature) follows the guidelines of the American National Standard for Specifications for the Chromaticity of Solid State Lighting (SSL) Products, ANSI C78.377-2011.

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.

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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).

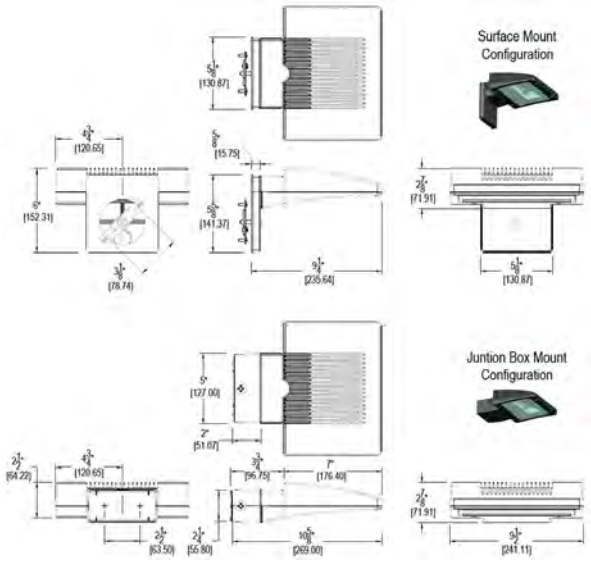
Trade Agreements Act Compliant:

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



Features

- Ultra-high efficiency LED 18 Watt wallpack
- Replaces 150W Metal Halide Wallpacks
- 100,00-Hour LED Lifespan
- 5-Year Warranty

Ordering Matrix

Family	Watts	Color Temp	Finish	Photocell
WPLED				
	18 = 18W	= Cool **Y** = Warm **N** = Neutral	= Bronze **W** = White	= No Photocell **/PC** = 120V Button **/PC2** = 277V Button

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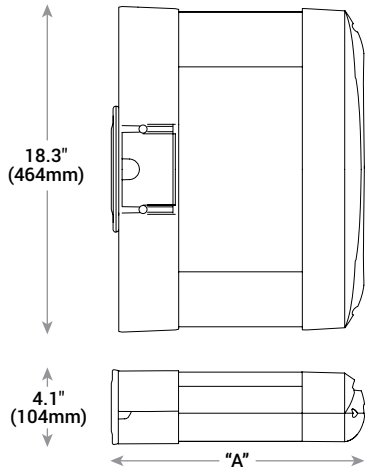
Cree Edge™ Series

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, weathertight 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

Field-Installed	
Bird Spikes XA-BRDSPK	**Hand-Held Remote** XA-SENSREM - For successful implementation of the programmable multi-level option, a minimum of one hand-held remote is required

LED Count (x10)	Dim. "A"	Weight
02	9.9" (251mm)	20 lbs. (9.1kg)
04	11.9" (303mm)	22 lbs. (10.0kg)
06	13.9" (353mm)	25 lbs. (11.3kg)
08	15.9" (404mm)	27 lbs. (12.2kg)
10	17.9" (455mm)	31 lbs. (14.1kg)
12	19.9" (505mm)	32 lbs. (14.5kg)

Ordering Information

Example: SEC-EDG-2M-WM-06-E-UL-SV-700

SEC-EDG		WM		E				
Product	**Optic**	**Mounting**	**LED Count (x10)**	**Series**	**Voltage**	**Color Options**	**Drive Current**	**Options**
SEC-EDG	**2M** Type II Medium **2MB** Type II Medium w/BLS **2S** Type II Short **2SB** Type II Short w/BLS **3M** Type III Medium **3MB** Type III Medium w/BLS **4M** Type IV Medium **4MB** Type IV Medium w/BLS	**WM** Wall Mount	**02** **04** **06** **08** **10** **12**	**E**	**UL** Universal 120-277V **UH** Universal 347-480V **34** 347V	**BK** Black **BZ** Bronze **SV** Silver **WH** White	**350** 350mA **525** 525mA -Available with 20-80 LEDs **700** 700mA -Available with 20-60 LEDs	**DIM 0-10V Dimming** - Control by others - Refer to Dimming spec sheet for details - Can't exceed specified drive current **F Fuse** - Refer to ML spec sheet for availability with ML options - Available with UL voltage only - When code dictates fusing, use time delay fuse **ML Multi-Level** - Refer to ML spec sheet for details - Intended for downlight applications of 0° tilt **P Photocell** - Refer to ML spec sheet for availability with ML options - Must specify UL or 34 voltage **PML Programmable Multi-Level** - Refer to PML spec sheet for details - Intended for downlight applications of 0° tilt **40K 4000K Color Temperature** - Minimum 70 CRI - Color temperature per luminaire

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 direct 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 C62.41.2
- Luminaire and finish endurance tested to withstand 5,000 hours of elevated ambient salt fog conditions as defined in ASTM Standard B 117
- 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*

LED Count (x10)	System Watts 120-480V	Total Current					
		120V	208V	240V	277V	347V	480V
350mA							
02	25	0.21	0.13	0.11	0.10	0.08	0.07
04	46	0.36	0.23	0.21	0.20	0.15	0.12
06	66	0.52	0.31	0.28	0.26	0.20	0.15
08	90	0.75	0.44	0.38	0.34	0.26	0.20
10	110	0.92	0.53	0.47	0.41	0.32	0.24
12	130	1.10	0.63	0.55	0.48	0.38	0.28
525mA							
02	37	0.30	0.19	0.17	0.16	0.12	0.10
04	70	0.58	0.34	0.31	0.28	0.21	0.16
06	101	0.84	0.49	0.43	0.38	0.30	0.22
08	133	1.13	0.66	0.58	0.51	0.39	0.28
700mA							
02	50	0.41	0.25	0.22	0.20	0.15	0.12
04	93	0.78	0.46	0.40	0.36	0.27	0.20
06	134	1.14	0.65	0.57	0.50	0.39	0.29

* Electrical data at 25˚C (77˚F)

Recommended Cree Edge™ Series Lumen Maintenance Factors (LMF)[1]

Ambient	Initial LMF	25K hr Projected[2] LMF	50K hr Projected[2] LMF	75K hr Calculated[3] LMF	100K hr Calculated[3] LMF
5˚C (41˚F)	1.04	0.99	0.97	0.95	0.93
10˚C (50˚F)	1.03	0.98	0.96	0.94	0.92
15˚C (59˚F)	1.02	0.97	0.95	0.93	0.91
20˚C (68˚F)	1.01	0.96	0.94	0.92	0.90
25˚C (77˚F)	1.00	0.95	0.93	0.91	0.89

[1] Lumen maintenance values at 25˚C 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 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

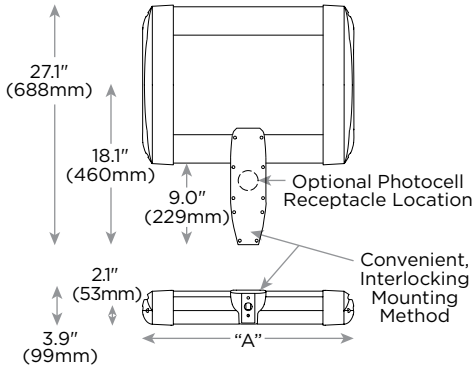
Slim, low profile design minimizes wind load requirements. Luminaire sides are rugged cast aluminum with integral, weathertight LED driver compartments and high performance aluminum heat sinks. Convenient, interlocking mounting method. Mounting housing is rugged die cast aluminum and mounts to 3–6″ (76–152mm) 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



LED Count (x10)	Dim. "A"
04	12.1″ (306mm)
06	14.1″ (357mm)
08	16.1″ (408mm)
10	18.1″ (459mm)
12	20.1″ (510mm)
14	22.1″ (560mm)
16	24.1″ (611mm)
20	28.1″ (713mm)
24	32.1″ (814mm)

Ordering Information

Example: ARE-EDG-3M-DA-04-E-UL-SV-350-OPTIONS

ARE-EDG	3M	DA		E				
Product	**Optic**	**Mounting**	**LED Count (x10)**	**Series**	**Voltage**	**Color Options**	**Drive Current**	**Options**
ARE-EDG	3M Type III Medium	DA Direct Arm	04 06 08 10 12 14 16 20 24 2	E	UL Universal 120–277V UH Universal 347–480V 34 347V	SV Silver (Standard) BK Black BZ Bronze PB Platinum Bronze WH White	350* 350mA 525** 525mA 700*** 700mA	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 Hi / Low (175 / 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 - Must specify voltage other than UH R 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.

www.cree.com/lighting T (800) 236-6800 F (262) 504-5415

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

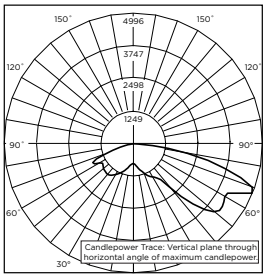
- **Input Voltage:** 120–277V or 347–480V, 50 / 60Hz, Class 1 drivers
- **Power Factor:** > 0.9 at full load
- **Total Harmonic Distortion:** < 20% at full load
- Integral weathertight electrical box with terminal strips (12Ga–20Ga) for easy power hookup
- Integral 10kV surge suppression protection standard
- To address inrush current, slow blow fuse or type C / D breaker should be used

REGULATORY & VOLUNTARY QUALIFICATIONS

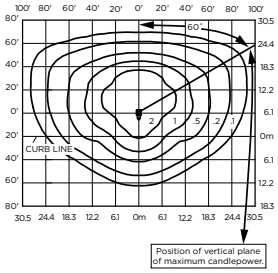
- cULus Listed
- Suitable for wet locations
- Enclosure rated IP66 per IEC 60529 when ordered without P or R options
- Consult factory for CE Certified products
- Certified to ANSI C136.31-2001, 3G bridge and overpass vibration standards
- 10kV surge suppression protection tested in accordance with IEEE / 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.



CSA Test Report #: 6401
ARE-EDG-3M-**-06-E-UL-700-40K
Initial Delivered Lumens: 10,657



ARE-EDG-3M-**-12-E-UL-525-40K
Mounting Height: 25′ (7.6m) A.F.G.
Initial Delivered Lumens: 16,790
Initial FC at grade

IES Files
To obtain an IES file specific to your project consult:
http://www.cree.com/lighting/tools-and-support/exterior-ies-configuration-tool

Lumen Output, Electrical, and Lumen Maintenance Data

Type III Medium Distribution												
LED Count (x10)	5700K		4000K		System Watts 120–480V	TOTAL CURRENT						50K Hours Projected Lumen Maintenance Factor @ 15˚C (59˚F)***
	Initial Delivered Lumens*	BUG Ratings** Per TM-15-11	Initial Delivered Lumens*	BUG Ratings** Per TM-15-11		120V	208V	240V	277V	347V	480V	
350mA @ 25˚C (77˚F)												
06	6,242	B2 U0 G2	6,011	B2 U0 G2	66	0.52	0.31	0.28	0.26	0.20	0.15	93%
08	8,323	B2 U0 G2	8,015	B2 U0 G2	90	0.75	0.44	0.38	0.34	0.26	0.20	
10	10,379	B3 U0 G3	9,994	B3 U0 G3	110	0.92	0.53	0.47	0.41	0.32	0.24	
12	12,454	B3 U0 G3	11,993	B3 U0 G3	130	1.10	0.63	0.55	0.48	0.38	0.28	
14	14,438	B3 U0 G3	13,903	B3 U0 G3	158	1.32	0.77	0.68	0.62	0.47	0.35	
16	16,501	B3 U0 G3	15,889	B3 U0 G3	179	1.49	0.87	0.77	0.68	0.53	0.39	
20	20,626	B3 U0 G3	19,862	B3 U0 G3	220	1.84	1.06	0.93	0.83	0.64	0.47	
24	24,751	B4 U0 G4	23,834	B4 U0 G4	261	2.19	1.26	1.10	0.97	0.76	0.56	
525mA @ 25˚C (77˚F)												
04	5,893	B2 U0 G2	5,675	B2 U0 G2	70	0.58	0.34	0.31	0.28	0.21	0.16	92%
06	8,739	B2 U0 G2	8,415	B2 U0 G2	101	0.84	0.49	0.43	0.38	0.30	0.22	
08	11,652	B3 U0 G3	11,220	B3 U0 G3	133	1.13	0.66	0.58	0.51	0.39	0.28	
10	14,530	B3 U0 G3	13,992	B3 U0 G3	171	1.43	0.83	0.74	0.66	0.50	0.38	
12	17,436	B3 U0 G3	16,790	B3 U0 G3	202	1.69	0.98	0.86	0.77	0.59	0.44	
14	20,213	B3 U0 G3	19,465	B3 U0 G3	232	1.94	1.12	0.98	0.87	0.68	0.50	
16	23,101	B3 U0 G3	22,245	B3 U0 G3	263	2.21	1.27	1.11	0.97	0.77	0.56	
700mA @ 25˚C (77˚F)												
04	7,198	B2 U0 G2	6,932	B2 U0 G2	92	0.78	0.46	0.40	0.36	0.27	0.20	90%
06	10,674	B3 U0 G3	10,279	B3 U0 G3	134	1.14	0.65	0.57	0.50	0.39	0.29	

* 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/Erratas/TM-15-11BugRatingsAddendum.pdf.
*** For recommended lumen maintenance factor data see TD-13. Calculated L_{70} 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

ARE-EDG-3M-AA

Cree Edge™ Area Luminaire – Type III Medium – Adjustable Arm Mount

Product Description

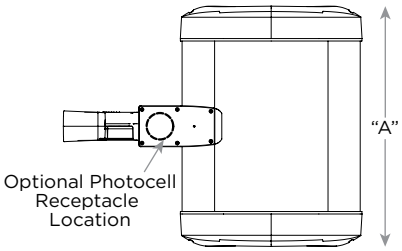
Slim, low profile design minimizes wind load requirements. Luminaire sides are rugged cast aluminum with integral, weathertight LED driver compartments and high performance aluminum heat sinks. Adjustable arm mount is rugged die cast aluminum and mounts to 2" (51mm) IP, 2.375" (60mm) O.D. tenon. Includes leaf / debris guard.

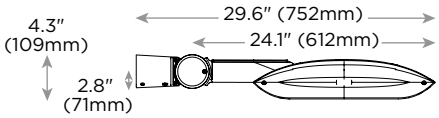
Performance Summary

- 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





LED Count (x10)	Dim. "A"
04	12.1" (306mm)
06	14.1" (357mm)
08	16.1" (408mm)
10	18.1" (459mm)
12	20.1" (510mm)
14	22.1" (560mm)
16	24.1" (611mm)
20	28.1" (713mm)
24	32.1" (814mm)

Ordering Information

Example: ARE-EDG-3M-AA-04-E-UL-SV-350-OPTIONS

ARE-EDG	3M	AA		E				
Product	**Optic**	**Mounting**	**LED Count (x10)**	**Series**	**Voltage**	**Color Options**	**Drive Current**	**Options**
ARE-EDG	**3M** Type III Medium	**AA** Adjustable Arm	**04** **06** **08** **10** **12** **14** **16** **20** **24**	**E**	**UL** Universal 120–277V **UH** Universal 347–480V **34** 347V	**SV** Silver (Standard) **BK** Black **BZ** Bronze **PB** Platinum Bronze **WH** White	**350*** 350mA **525**** 525mA **700***** 700mA	**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 Hi / Low (175 / 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 - Must specify voltage other than UH **R NEMA Photocell Receptacle** - Not available with all ML options. Refer to ML spec sheet for availability with ML options - Intended for downlight applications at 0° tilt - 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.

Rev. Date: 09/27/13

www.cree.com/lighting T (800) 236-6800 F (262) 504-5415

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

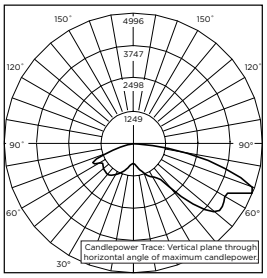
- **Input Voltage:** 120–277V or 347–480V, 50 / 60Hz, Class 1 drivers
- **Power Factor:** > 0.9 at full load
- **Total Harmonic Distortion:** < 20% at full load
- Integral weathertight electrical box with terminal strips (12Ga–20Ga) for easy power hookup
- Integral 10kV surge suppression protection standard
- To address inrush current, slow blow fuse or type C / D breaker should be used

REGULATORY & VOLUNTARY QUALIFICATIONS

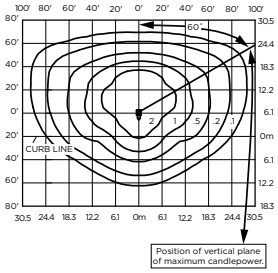
- cULus Listed
- Suitable for wet locations
- Enclosure rated IP66 per IEC 60529 when ordered without P or R options
- Consult factory for CE Certified products
- Certified to ANSI C136.31-2001, 3G bridge and overpass vibration standards
- 10kV surge suppression protection tested in accordance with IEEE / ANSI C62.41.2
- 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.



CSA Test Report #: 6401
ARE-EDG-3M-**-06-E-UL-700-40K
Initial Delivered Lumens: 10,657



ARE-EDG-3M-**-12-E-UL-525-40K
Mounting Height: 25' (7.6m) A.F.G.
Initial Delivered Lumens: 16,790
Initial FC at grade

IES Files
To obtain an IES file specific to your project consult:
http://www.cree.com/lighting/tools-and-support/exterior-ies-configuration-tool

Lumen Output, Electrical, and Lumen Maintenance Data

Type III Medium Distribution												
LED Count (x10)	5700K		4000K		System Watts 120–480V	TOTAL CURRENT						50K Hours Projected Lumen Maintenance Factor @ 15 °C (59 °F)***
	Initial Delivered Lumens*	BUG Ratings** Per TM-15-11	Initial Delivered Lumens*	BUG Ratings** Per TM-15-11		120V	208V	240V	277V	347V	480V	
350mA @ 25 °C (77 °F)												
06	6,242	B2 U0 G2	6,011	B2 U0 G2	66	0.52	0.31	0.28	0.26	0.20	0.15	93%
08	8,323	B2 U0 G2	8,015	B2 U0 G2	90	0.75	0.44	0.38	0.34	0.26	0.20	
10	10,379	B3 U0 G3	9,994	B3 U0 G3	110	0.92	0.53	0.47	0.41	0.32	0.24	
12	12,454	B3 U0 G3	11,993	B3 U0 G3	130	1.10	0.63	0.55	0.48	0.38	0.28	
14	14,438	B3 U0 G3	13,903	B3 U0 G3	158	1.32	0.77	0.68	0.62	0.47	0.35	
16	16,501	B3 U0 G3	15,889	B3 U0 G3	179	1.49	0.87	0.77	0.68	0.53	0.39	
20	20,626	B3 U0 G3	19,862	B3 U0 G3	220	1.84	1.06	0.93	0.83	0.64	0.47	
24	24,751	B4 U0 G4	23,834	B4 U0 G4	261	2.19	1.26	1.10	0.97	0.76	0.56	
525mA @ 25 °C (77 °F)												
04	5,893	B2 U0 G2	5,675	B2 U0 G2	70	0.58	0.34	0.31	0.28	0.21	0.16	92%
06	8,739	B2 U0 G2	8,415	B2 U0 G2	101	0.84	0.49	0.43	0.38	0.30	0.22	
08	11,652	B3 U0 G3	11,220	B3 U0 G3	133	1.13	0.66	0.58	0.51	0.39	0.28	
10	14,530	B3 U0 G3	13,992	B3 U0 G3	171	1.43	0.83	0.74	0.66	0.50	0.38	
12	17,436	B3 U0 G3	16,790	B3 U0 G3	202	1.69	0.98	0.86	0.77	0.59	0.44	
14	20,213	B3 U0 G3	19,465	B3 U0 G3	232	1.94	1.12	0.98	0.87	0.68	0.50	
16	23,101	B3 U0 G3	22,245	B3 U0 G3	263	2.21	1.27	1.11	0.97	0.77	0.56	
700mA @ 25 °C (77 °F)												
04	7,198	B2 U0 G2	6,932	B2 U0 G2	92	0.78	0.46	0.40	0.36	0.27	0.20	90%
06	10,674	B3 U0 G3	10,279	B3 U0 G3	134	1.14	0.65	0.57	0.50	0.39	0.29	

* 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/Erratas/TM-15-11BugRatingsAddendum.pdf. Vaild with no tilt.
*** For recommended lumen maintenance factor data see TD-13. Calculated L_{70} 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

ARE-EDG-4M-DA

Cree Edge™ Area Luminaire – Type IV Medium – Direct Arm Mount

Product Description

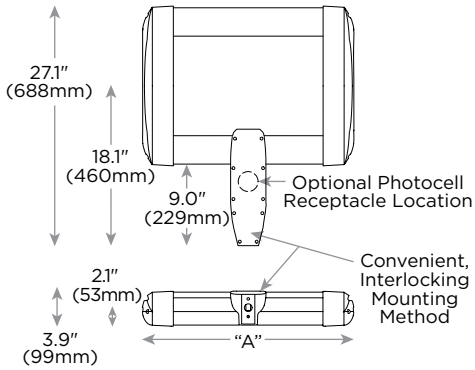
Slim, low profile design minimizes wind load requirements. Luminaire sides are rugged cast aluminum with integral, weathertight LED driver compartments and high performance aluminum heat sinks. Convenient, interlocking mounting method. Mounting housing is rugged die cast aluminum and mounts to 3–6″ (76–152mm) 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



LED Count (x10)	Dim. "A"
04	12.1″ (306mm)
06	14.1″ (357mm)
08	16.1″ (408mm)
10	18.1″ (459mm)
12	20.1″ (510mm)
14	22.1″ (560mm)
16	24.1″ (611mm)
20	28.1″ (713mm)
24	32.1″ (814mm)

Ordering Information

Example: ARE-EDG-4M-DA-04-E-UL-SV-350-OPTIONS

ARE-EDG	4M	DA		E				
Product	**Optic**	**Mounting**	**LED Count (x10)**	**Series**	**Voltage**	**Color Options**	**Drive Current**	**Options**
ARE-EDG	**4M** Type IV Medium	**DA** Direct Arm	**04** **06** **08** **10** **12** **14** **16** **20** **24**	**E**	**UL** Universal 120–277V **UH** Universal 347–480V **34** 347V	**SV** Silver (Standard) **BK** Black **BZ** Bronze **PB** Platinum Bronze **WH** White	**350*** 350mA **525**** 525mA **700***** 700mA	**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 Hi / Low (175 / 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 - Must specify voltage other than UH **R 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.

Rev. Date: 09/27/13

www.cree.com/lighting T (800) 236-6800 F (262) 504-5415

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

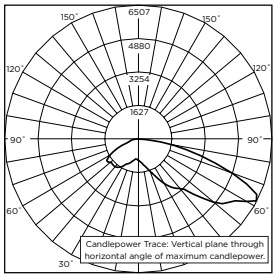
- **Input Voltage:** 120–277V or 347–480V, 50 / 60Hz, Class 1 drivers
- **Power Factor:** > 0.9 at full load
- **Total Harmonic Distortion:** < 20% at full load
- Integral weathertight electrical box with terminal strips (12Ga–20Ga) for easy power hookup
- Integral 10kV surge suppression protection standard
- To address inrush current, slow blow fuse or type C / D breaker should be used

REGULATORY & VOLUNTARY QUALIFICATIONS

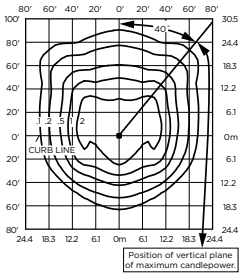
- cULus Listed
- Suitable for wet locations
- Enclosure rated IP66 per IEC 60529 when ordered without P or R options
- Consult factory for CE Certified products
- Certified to ANSI C136.31-2001, 3G bridge and overpass vibration standards
- 10kV surge suppression protection tested in accordance with IEEE / 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.



CSA Test Report #: 6438
ARE-EDG-4M-**-06-E-UL-700-40K
Initial Delivered Lumens: 11,367



ARE-EDG-4M-**-12-E-UL-525-40K
Mounting Height: 25′ (7.6m) A.F.G.
Initial Delivered Lumens: 17,710
Initial FC at grade

IES Files
To obtain an IES file specific to your project consult:
http://www.cree.com/lighting/tools-and-support/exterior-ies-configuration-tool

Lumen Output, Electrical, and Lumen Maintenance Data

Type IV Medium Distribution												
LED Count (x10)	5700K		4000K		System Watts 120–480V	TOTAL CURRENT						50K Hours Projected Lumen Maintenance Factor @ 15˚C (59˚F)***
	Initial Delivered Lumens*	BUG Ratings** Per TM-15-11	Initial Delivered Lumens*	BUG Ratings** Per TM-15-11		120V	208V	240V	277V	347V	480V	
350mA @ 25˚C (77˚F)												
06	6,584	B2 U0 G2	6,340	B2 U0 G2	66	0.52	0.31	0.28	0.26	0.20	0.15	93%
08	8,779	B2 U0 G2	8,454	B2 U0 G2	90	0.75	0.44	0.38	0.34	0.26	0.20	
10	10,947	B2 U0 G2	10,542	B2 U0 G2	110	0.92	0.53	0.47	0.41	0.32	0.24	
12	13,137	B3 U0 G3	12,650	B3 U0 G3	130	1.10	0.63	0.55	0.48	0.38	0.28	
14	15,229	B3 U0 G3	14,665	B3 U0 G3	158	1.32	0.77	0.68	0.62	0.47	0.35	
16	17,405	B3 U0 G3	16,760	B3 U0 G3	179	1.49	0.87	0.77	0.68	0.53	0.39	
20	21,756	B3 U0 G3	20,950	B3 U0 G3	220	1.84	1.06	0.93	0.83	0.64	0.47	
24	26,107	B4 U0 G3	25,140	B4 U0 G3	261	2.19	1.26	1.10	0.97	0.76	0.56	
525mA @ 25˚C (77˚F)												
04	6,216	B2 U0 G2	5,986	B2 U0 G1	70	0.58	0.34	0.31	0.28	0.21	0.16	92%
06	9,218	B2 U0 G2	8,876	B2 U0 G2	101	0.84	0.49	0.43	0.38	0.30	0.22	
08	12,290	B3 U0 G3	11,835	B3 U0 G2	133	1.13	0.66	0.58	0.51	0.39	0.28	
10	15,326	B3 U0 G3	14,759	B3 U0 G3	171	1.43	0.83	0.74	0.66	0.50	0.38	
12	18,391	B3 U0 G3	17,710	B3 U0 G3	202	1.69	0.98	0.86	0.77	0.59	0.44	
14	21,321	B3 U0 G3	20,531	B3 U0 G3	232	1.94	1.12	0.98	0.87	0.68	0.50	
16	24,367	B4 U0 G3	23,464	B3 U0 G3	263	2.21	1.27	1.11	0.97	0.77	0.56	
700mA @ 25˚C (77˚F)												
04	7,593	B2 U0 G2	7,311	B2 U0 G2	92	0.78	0.46	0.40	0.36	0.27	0.20	90%
06	11,259	B2 U0 G2	10,842	B2 U0 G2	134	1.14	0.65	0.57	0.50	0.39	0.29	

* 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/Erratas/TM-15-11BugRatingsAddendum.pdf.
*** For recommended lumen maintenance factor data see TD-13. Calculated L_{70} based on 6,000 hours LM-80-08 testing: > 150,000 hours.

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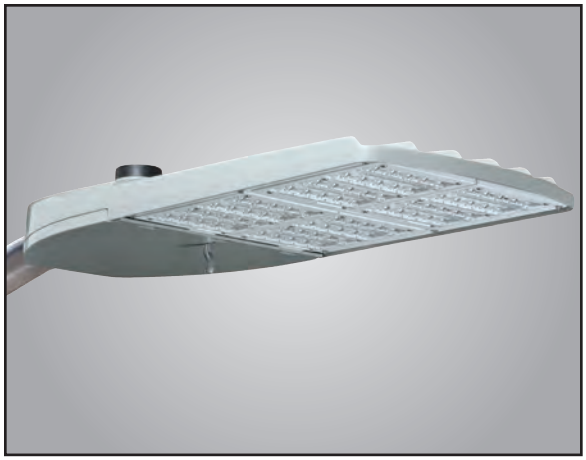
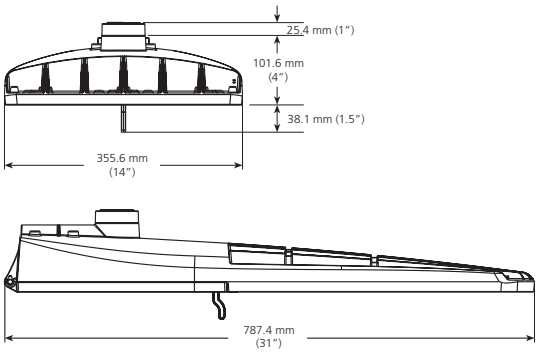
PRODUCT OVERVIEW



Applications:

Roadways
Off ramps
Residential streets
Parking lots

DIMENSIONS



Effective Projected Area (EPA)
The EPA for the ATB2 is 0.78 sq. ft.,
Approx. Wt. = 21 lbs. (9.53 kg)

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).

Mulit-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

Complies with ANSI: C136.2, C136.10, C136.14, C136.31, C136.15, C136.37

ORDERING INFORMATION

Example: ATB2 40LEDE70 MVOLT R2

Series

ATB2	Autobahn LED Roadway

Performance Packages

40BLEDE70	40B Chips, 700mA Driver
40BLEDE10	40B Chips, 1050mA Driver
40BLEDE13	40B Chips, 1300mA Driver
40BLEDE15[1]	40B Chips, 1500mA Driver
60BLEDE70	60B Chips, 700mA Driver
60BLEDE85	60B Chips, 850mA Driver
60BLEDE10	60B Chips, 1050mA Driver
60BLEDE13	60B Chips, 1300mA Driver
80BLEDE70	80B Chips, 700mA Driver
80BLEDE85	80B Chips, 850mA Driver
80BLEDE10	80B Chips, 1050mA Driver

Voltage

MVOLT	Multi-volt, 120-277V
347	347V
480	480V

Optics

R2	Roadway Type II
R3	Roadway Type III
R4	Roadway Type IV
R5	Roadway Type V

Options

Color Temperature (CCT)

(Blank)	4000K CCT, 70 CRI Min. (Standard)
5K	5000K CCT, 70 CRI Min.

Paint

(Blank)	Gray (Standard)
BK	Black
BZ	Bronze
DDB	Dark Bronze
GI	Graphite
WH	White

Surge Protection

Blank	Standard 10kV/5kA SPD
20	20kV/10KA SPD
MP[1]	MOV Pack
IL[1]	SPD with Indicator Light

Terminal Block

(Blank)	Terminal Block (Standard)
T2	Wired to L1 & L2 Positions

Misc.

BL	External Bubble Level
CR	Enhanced Corrosion Resistant Finish
HS	House-Side Shield
NL	Nema Label
XL	Not CSA Certified
HK	Hingekeepers

Controls

(Blank)	3 Pin NEMA Photocontrol Receptacle (Standard)
P5[2]	5 Pin Photocontrol Receptacle (Dimmable Driver Included)
P7[2]	7 Pin Photocontrol Receptacle (Dimmable Driver Included)
NR	No Photocontrol Receptacle
AO[2]	Field Adjustable Output
DM	0V-10V Dimmable Driver (Controls by others)
ML[3,4]	Multi-Level Dimming
PCSS[1]	Solid State Lighting Photocontrol (120-277V)
PCLL	Solid State Long Life Photocontrol
SH	Shorting Cap

Packaging

(Blank)	Single Unit (Standard)
JP	Job Pack (24/Pallet)

Notes

1. Not available in 347 or 480V.
2. Not available with DM or ML options.
3. Not available with AO, DM, P5 or P7 options.
4. Dimming schedule and light level information required from the customer in order to configure product. Contact Infrastructure Technical Support to proceed.

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Warranty Five-year limited warranty. Complete warranty terms located at: 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.

PERFORMANCE PACKAGE

Performance Package	Drive Current (mA)	Input Watts	Optic	4000K CCT		LLD @ 25°C	
				Delivered Lumens	Efficacy (LPW)	50k Hours	100k Hours
40B	700	91	R2	11266	124	0.98	0.96
	1000	138		15685	114	0.95	0.90
	1300	177		18277	103	0.94	0.88
	1500	204		20590	101	0.91	0.85
	700	91	R3	11160	123	0.98	0.96
	1000	138		15520	112	0.95	0.90
	1300	177		18050	102	0.94	0.88
	1500	204		20036	98	0.91	0.85
	700	91	R4	10775	118	0.98	0.96
	1000	138		15015	109	0.95	0.90
	1300	177		17341	98	0.94	0.88
	1500	204		19458	95	0.91	0.85
	700	91	R5	12097	133	0.98	0.96
	1000	138		16729	121	0.95	0.90
	1300	177		19564	111	0.94	0.88
	1500	204		21678	106	0.91	0.85
60B	700	133	R2	16986	128	0.98	0.96
	850	173		19966	115	0.95	0.90
	1000	208		23710	114	0.95	0.90
	1300	260		27308	105	0.94	0.88
	700	133	R3	17128	129	0.98	0.96
	850	173		20105	116	0.95	0.90
	1000	208		23250	112	0.95	0.90
	1300	260		27477	106	0.94	0.88
	700	133	R4	16516	124	0.98	0.96
	850	173		19429	112	0.95	0.90
	1000	208		22718	109	0.95	0.90
	1300	260		26400	102	0.94	0.88
	700	133	R5	17882	134	0.98	0.96
	850	173		21000	121	0.95	0.90
	1000	208		24673	119	0.95	0.90
	1300	260		28838	111	0.94	0.88
80B	700	180	R2	22528	125	0.98	0.96
	850	224		26394	118	0.95	0.90
	1000	274		30998	113	0.95	0.90
	700	180	R3	22127	123	0.98	0.96
	850	224		25955	116	0.95	0.90
	1000	274		30491	111	0.95	0.90
	700	180	R4	21701	121	0.98	0.96
	850	224		25350	113	0.95	0.90
	1000	274		29567	108	0.95	0.90
	700	180	R5	23799	132	0.98	0.96
	850	224		27851	124	0.95	0.90
	1000	274		32391	118	0.95	0.90

Note: Information shown above is based on nominal system data. Individual fixture performance may vary. Specifications subject to change without notice.

ATB2 LLD Multiplier	15°C	20°C	25°C	30°C	35°C	40°C
	1.02	1.01	1	0.99	0.97	0.96

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.

American Electric Lighting
AEL Headquarters, 3825 Columbus Road, Granville, OH 43023
www.americanelectriclighting.com
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Warranty Five-year limited warranty. Complete warranty terms located at:
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.

FIRSTLIGHT TECHNOLOGIES

Making Solar Lighting Simple™

PLB Series

Solar Powered LED Bollard

Project: _____

Type: _____ Quantity: _____

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

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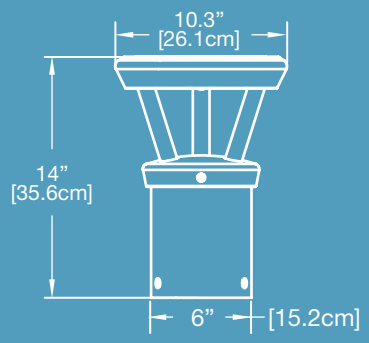
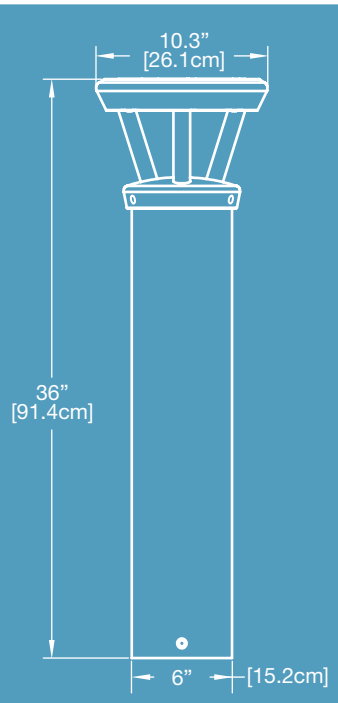
FIRSTLIGHT TECHNOLOGIES
Making Solar Lighting Simple™

PLB Series

Solar Powered LED Bollard

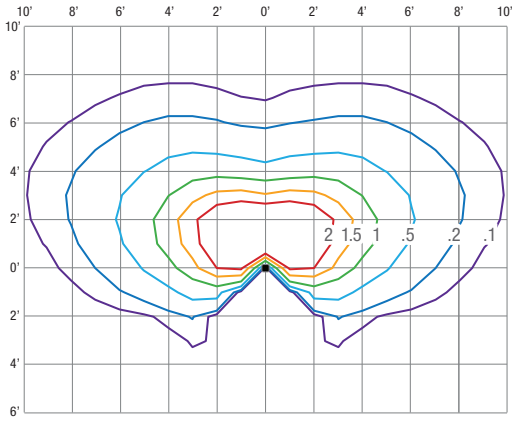


PLB – 101

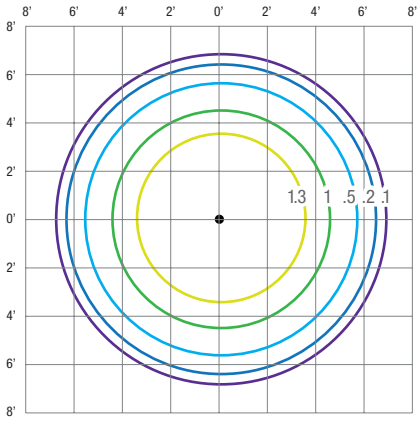


PLB – 102

PHOTOMETRICS



PLB - 102 Type III



PLB - 102 Type V

ORDER MATRIX

Series	Height	Finish	Distribution	LED Color	Lighting Profile	Options
PLB	**101** - 14”	**BK** - Black	**ASM** - Type III	**30K** - 3000K	**00** - Dusk till dawn	**WOB** - Ship Without Battery
	102 - 36”	**BZ** - Bronze	**SYM** - Type V	**43K** - 4300K	**01** - Dark +6 hours then off	**SEC** - Security Fasteners
		SV - Silver		**55K** - 5500K	**02** - Dark +6 hours then 30% (DEFAULT)	
		WH - White		**AMB** - Amber	**03** - Dark +5 hours, off, Dawn -1 hour	
		CC - Custom			**04** - Dark +5 hours, 30%, Dawn -1 hour	

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

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PLB: 70-0004 11/10/12

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6" LED Open Downlight

RLF6LEDG4

120V–277V

0-10V Dimming

DATE: TYPE:

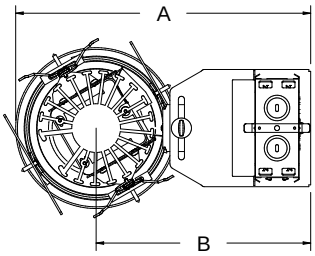
FIRM NAME:

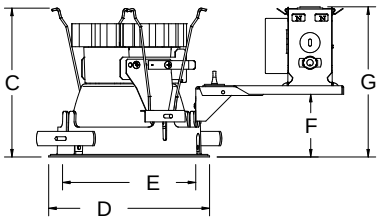
PROJECT:

RETROFICIENT

ENERGY STAR

Ceiling Cutout: see guide
Maximum Ceiling Thickness 1½"
For conversion to millimeters, multiply inches by 25.4
Not to Scale





*Dimensions shown are for range of adjustability.

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:

High purity aluminum, Alzak, iridescence suppressed, semi-diffuse upper reflector. Self-trim standard. Painted white self-trim (WT) available as option. Reflector is made from anodized Alanod Miro 4 aluminum.

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.

	"A"*	"B"*	"C"*	"D"*	"E"*	"F"*	"G"*
RLF6LEDG4 6LFLED5G4 RLF6LEDG4 6LFLED6G4 RLF6LEDG4 6LFLED7G4	12-3/4" - 15"	8-7/8" - 10-3/4"	6-3/4"	7"	5-3/4"	2-1/2" - 3-3/4"	6-1/4" - 7-1/2"

EXAMPLE: RLF6LEDG4 - 6LFLED5G430K
EXAMPLE: RLF6LED7G4120HDM-6LFLED7G435KWHWT

CATALOG NUMBER:

Order housing, reflector, and accessories separately

STANDARD 0-10V DIMMING

HOUSING/LED GENERATION	VOLTAGE	OPTIONS	TRIM	LED COLOR TEMP	REF. FINISH	LOWER REF. COLOR	REF. OPTIONS	ACCESSORIES
❑ **RLF6LEDG4** 6" High Efficacy LED Housing	❑ **Blank** 120V–277V	❑ **Blank** Standard 0-10V dimming to 10% ❑ **SD**[1] Small Diameter	❑ **6LFLED5G4** 1100 Lumen Module ❑ **6LFLED6G4** 1500 Lumen Module ❑ **6LFLED7G4** 2000 Lumen Module	❑ **30K** ❑ **35K** ❑ **40K**	❑ **Blank** Semi-Diffuse	❑ **Blank** Clear ❑ **CG** Champagne Gold ❑ **BL** Black ❑ **WE** Wheat ❑ **LW** Light Wheat ❑ **PW** Pewter ❑ **WH**[1] White Paint	❑ **WT** White Trim ❑ **WF** Wide Flange	❑ **LFSC6** 6" reflector screw cover ❑ **LiteGear** See page 3 for availability ❑ **RWD6** Retrofit wide diameter housing kit

ALTERNATIVE DIMMING TO 1%

Use with HDM/DM1/2DM dimming option: Match Housing to Trim Output

❑ **RLF6LED5G4** ❑ **RLF6LED6G4** ❑ **RLF6LED7G4**	❑ **120** ❑ **277**	❑ **HDM**[3] Lutron 3-wire Eco System to 1% ❑ **2DM**[3] Lutron 2-wire Leading Edge to 1% (120V only) ❑ **DM1**[3] 0-10V dimming to 1% ❑ **SD**[1] Small Diameter

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

prescolite

A Division of Hubbell Lighting, Inc.

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**

RTF-014

PHOTOMETRIC DATA

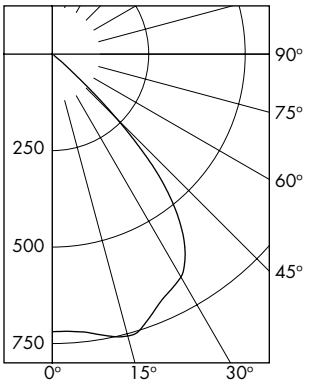
Retroficient - 6" RLF6LEDG4 Downlight

DRIVER DATA	RLF6LED5G4 30K	RLF6LED7G4 30K
Input Voltage	120-277V	120-277V
Input Frequency	50/60 Hz	50/60 Hz
Input Current	0.12A (120v)	0.22A (120v)
	0.052A (277v)	0.10A (277v)
Input Power	14.5W	26.5W
Constant Current Output	200–1000mA	200–1000mA
Power Factor	≥0.90	≥0.90
THD	<20%	<20%
EMI Filtering	FCC 47CFR	FCC 47CFR
	Part 15, Class A	Part 15, Class A
Operating Temperature	-20°C to 40°C	-20°C to 40°C
Dimming	0-10V	0-10V

Over-voltage, over-current, short-circuit protected

*Power consumption and photometric output may vary slightly with HDM or 2DM driver

RLF6LEDG4 6LFLED5G4 30K
LED Light Engine: 3000K, 80 CRI
System Wattage: 14.5W
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	

Test No. 8458
Tested at 25°C Ambient in accordance to IESNA LM-79-2008

ZONAL LUMEN SUMMARY

ZONE	LUMENS	%LUMINAIRE
0-30	602	52.0
0-40	967	83.6
0-60	1157	100.0
0-90	1157	100.0
90-180	0	0.0
0-180	1157	100.0

LUMINANCE DATA IN CANDELA/ SQ. METER

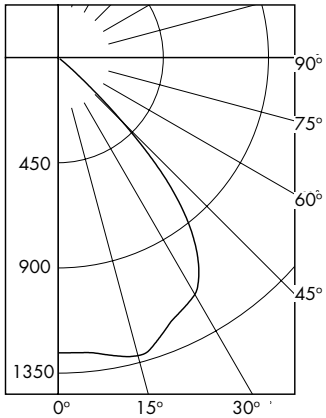
Angle in Vertical	Average
45°	18290
55°	382
65°	0
75°	0
85°	0

COEFFICIENTS OF UTILIZATION Zonal Cavity Method

Room Cavity Ratio	% Effective Ceiling Cavity Reflectance																
	80%				70%				50%			30%			10%		
	20% Effective Floor Cavity Reflectance																
	% Wall Reflectance																
	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10
1	113	110	107	105	110	108	105	103	104	102	100	100	98	97	96	95	94
2	107	101	97	93	104	99	95	92	96	93	90	93	90	88	90	88	86
3	100	93	87	83	98	92	87	82	89	85	81	86	83	80	84	81	79
4	94	86	80	75	92	85	79	74	82	77	73	80	76	73	78	75	72
5	88	79	73	68	87	78	72	67	76	71	67	74	70	66	73	69	65
6	83	73	66	61	82	72	66	61	71	65	61	69	64	60	68	63	60
7	78	68	61	56	77	67	61	56	66	60	56	64	59	55	63	59	55
8	74	63	56	51	72	62	56	51	61	55	51	60	55	51	59	54	51
9	69	58	52	47	68	58	52	47	57	51	47	56	51	47	55	50	47
10	65	55	48	44	64	54	48	44	53	47	43	52	47	43	52	47	43

RLF6LEDG4 6LFLED5G4 30K — Test No. 8458

RLF6LEDG4 6LFLED7G4 30K
LED Light Engine: 3000K, 80 CRI
System Wattage: 26.4W
Fixture Delivered Lumens: 2013
Fixture Efficacy: 76.1
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	

Test No. 8459
Tested at 25°C Ambient in accordance to IESNA LM-79-2008

ZONAL LUMEN SUMMARY

ZONE	LUMENS	%LUMINAIRE
0-30	1053	52.3
0-40	1690	83.9
0-60	2011	99.9
0-90	2013	100.0
90-180	0	0.0
0-180	2013	100.0

LUMINANCE DATA IN CANDELA/ SQ. METER

Angle in Vertical	Average
45°	30302
55°	860
65°	259
75°	0
85°	0

COEFFICIENTS OF UTILIZATION Zonal Cavity Method

Room Cavity Ratio	% Effective Ceiling Cavity Reflectance																
	80%				70%				50%			30%			10%		
	20% Effective Floor Cavity Reflectance																
	% Wall Reflectance																
	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10
1	113	110	107	105	110	108	105	103	104	102	100	100	98	97	96	95	94
2	107	101	97	93	104	99	95	92	96	93	90	93	90	88	90	88	86
3	100	93	88	83	98	92	87	82	89	85	81	86	83	80	84	81	79
4	94	86	80	75	92	85	79	74	82	77	73	80	76	73	78	75	72
5	89	79	73	68	87	78	72	67	76	71	67	75	70	66	73	69	66
6	83	73	66	62	82	72	66	61	71	65	61	69	64	60	68	63	60
7	78	68	61	56	77	67	61	56	66	60	56	64	59	55	63	59	55
8	74	63	56	52	72	62	56	51	61	55	51	60	55	51	59	54	51
9	69	59	52	47	68	58	52	47	57	51	47	56	51	47	55	50	47
10	66	55	48	44	64	54	48	44	53	48	44	52	47	43	52	47	43

RLF6LEDG4 6LFLED7G4 30K — Test No. 8459

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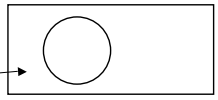
HUBBELL Lighting, Inc.

Housing Compatibility Guide		
Ordering Guidelines	6 inch	
	min	max
Requires SD Housing Option	5-15/16	6-1/8
All Standard Housings	6-1/8	6-1/2
Requires RWD Kit Accessory & WF Reflector Option	6-1/2	6-7/8

Dimensions shown are for the diameter of the frame flange at it's 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/

Dimming Compatibility Table

Dimming Ballast	Manufacturer	Web Link
DM/DM1	Lutron DVTV	http://bit.ly/11jSvZg
DM/DM1	Leviton AWRMG-7xx, AWSMG-7xx, AWSMT-7xx	http://bit.ly/1BJn2R9
HDM	Lutron	http://bit.ly/1vtjHAl
2DM	Lutron	http://bit.ly/1nF4Zp1

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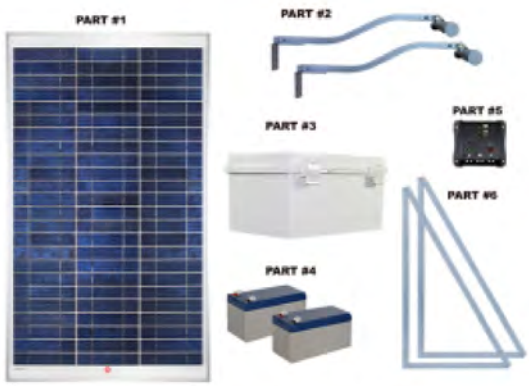


FL57 SOLAR LED SIGN LIGHT SYSTEM (2 OR 3 FIXTURES)

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

DESCRIPTION

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
Manufactured in an ISO9001:2008 'Quality Assured' facility.
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 I.P 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

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.

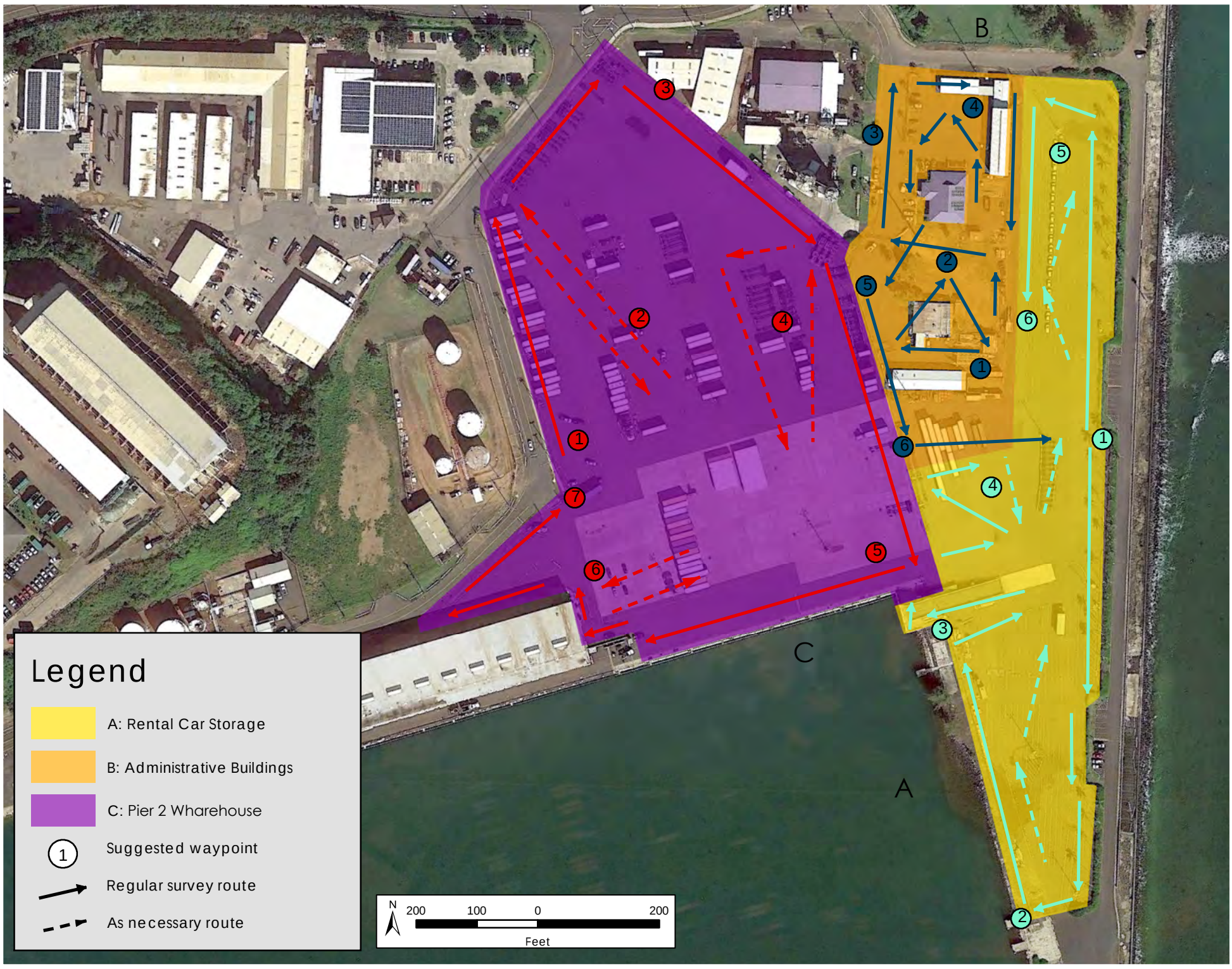
SPECIFICATION

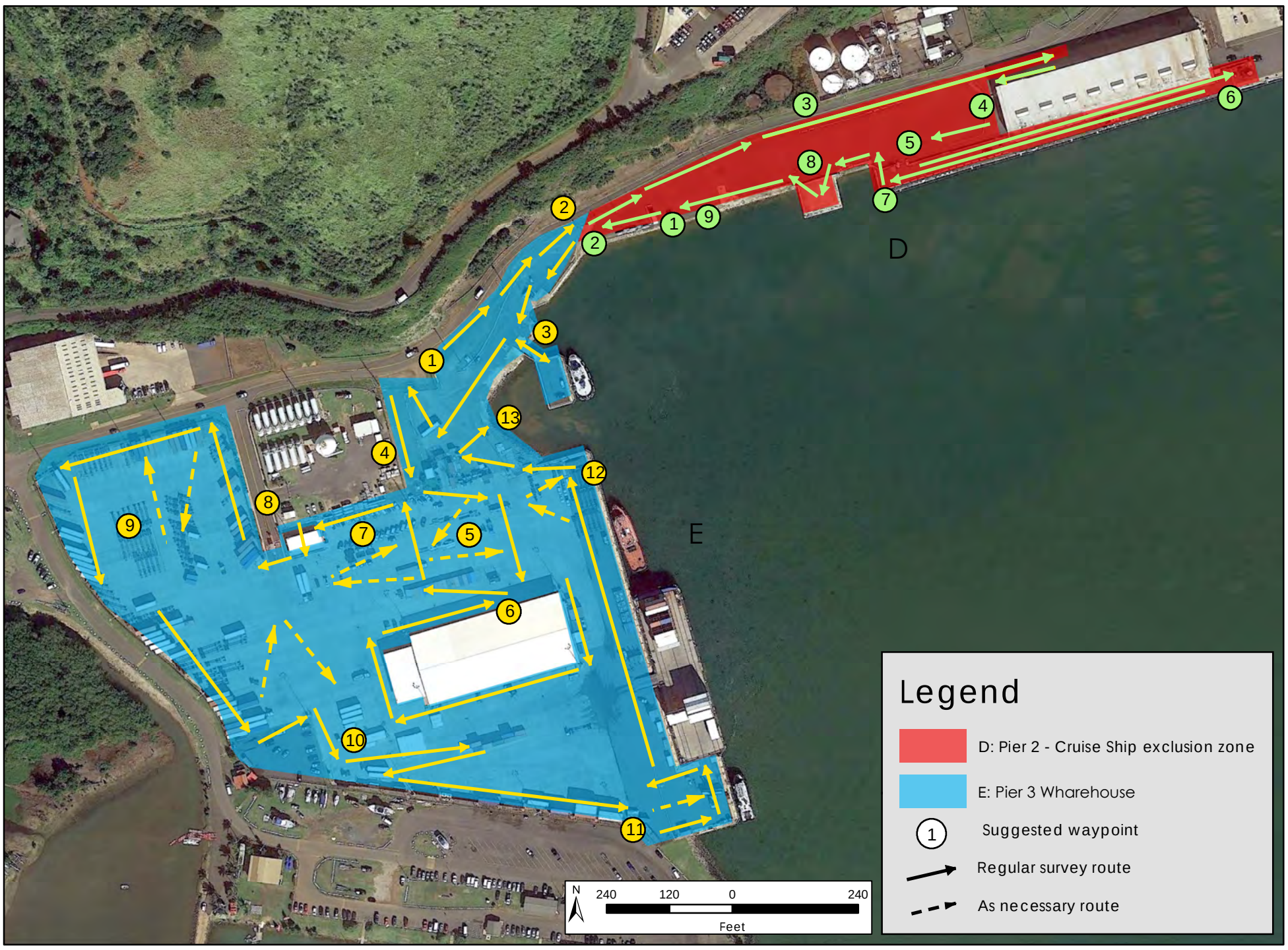
SOLAR LIGHTS DATA	
.	.
Lumen Output	150 Lumens per lamp.
Equivalent Incandescent Wattage	Approx. 25 Watts per lamp.
Approximate Illumination Time	Typically dusk to dawn.
Approximate Sign SIze	Up to 4' x 4' (1.2m x 1.2m).
Solar Panel Wattage	From 45 Watts.
Programable Controller	Yes.

TAGS:

Tags: FL57, Sign Light, Above Sign

Appendix B. Details of Monitoring Protocol, Data Collection Sheets, Instructions, and Maps of Survey Routes for the KSHCP Seabird Monitoring Program at Nawiliwili Harbor, Port Allen Harbor, and Lihue Airport.





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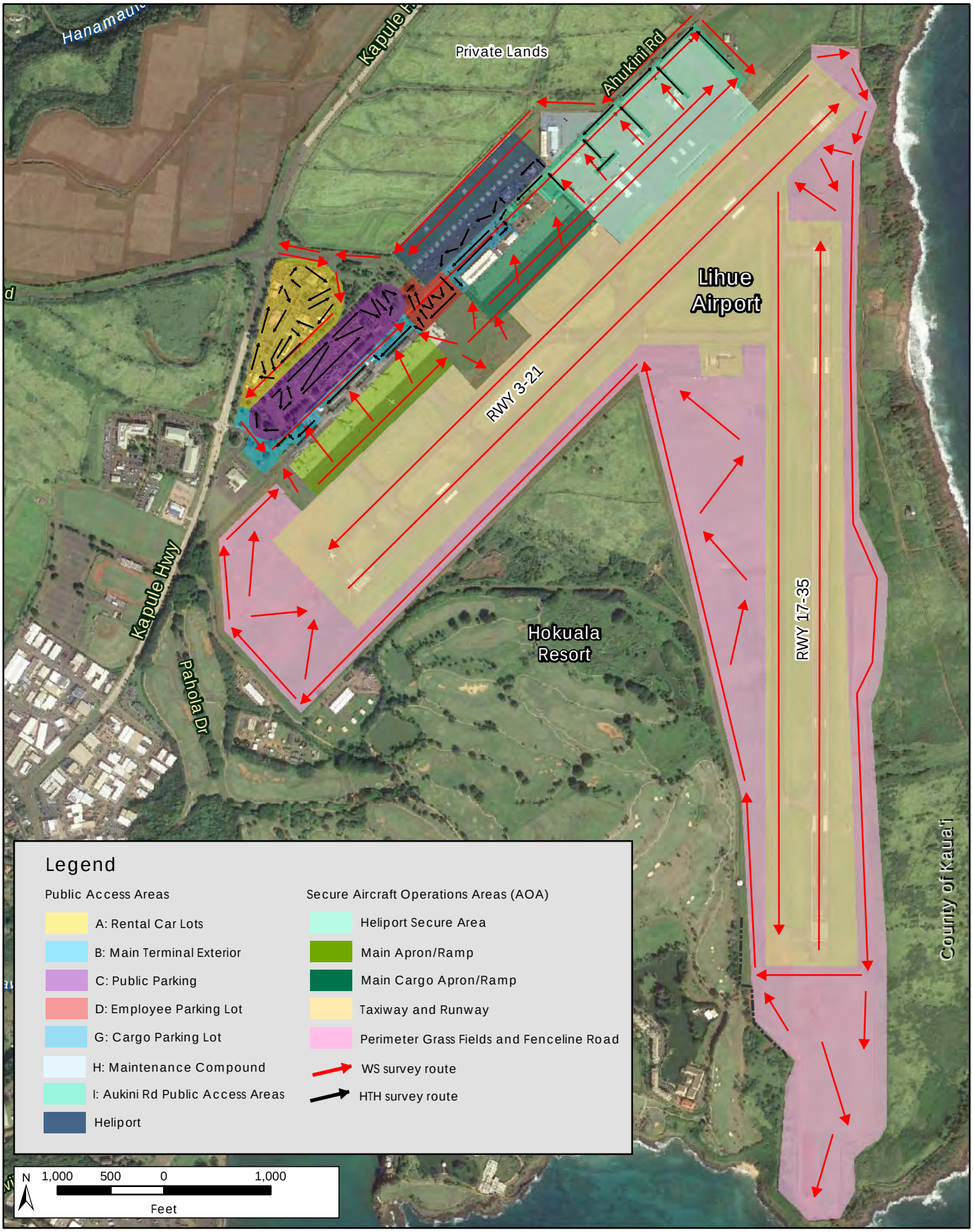
Nawiliwili Harbor Seabird Monitoring Survey Routes 4065-02

December 2018

Port Allen Survey Routes
N
A
B
C
D
A: Main Parking
B: Storage Area
C: Makai Pier
D: Mauka Pier – (DoD Restricted)
Suggested waypoint
Regular survey route
As necessary route



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Seabird Monitoring Routes in Public Access and Secure Areas of Lihue Airport

Lihue Airport (4065-01)

December 2018

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 _____

ID #	Species	GPS Coordinates		Time of discovery	Condition	Distance	Type
		Latitude	Longitude				

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

Date	
Type of Discovery (circle one)	Routine Search Incidental
Discovered by	
Affiliation	
Species (common name)	
Time Discovered	
Time Initially Reported to Agencies	
Time Agency Responders Arrive/Advise	
Location Description	
GPS Coordinates	
Distance of bird to base of nearest light (m)	
Bearing from base of nearest light (deg)	
Ground Type (paved, grass, shrub, other)	
Wind Direction and Speed (mph)	
Cloud Cover (%)	
Cloud Deck (estimated magl)	
Precipitation	
Temperature (^{o}F if known)	
Photos taken[1] (circle one)	Yes No

[1] All photos are assigned an ID# and are recorded in the Photo Log.

Descriptive Information

Condition of Bird:
Probable Cause of Grounding and Supporting Evidence:
Sequence of Response Measures:

Additional Comments

Attach 2-3 photos to this report.

Seabird Monitoring – Supplemental Information Form

Hawaii Department of Transportation

Survey Location _____ Date _____

Observer Name _____

ID #	Description of conditions where a grounded bird is discovered, presence of cats or mongoose, number of photos, actions taken, other relevant information.

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.

Common Name	Species Code
Hawaiian Petrel	HAPE
Newell‘s Shearwater	NESH
Wedge-tailed Shearwater	WTSH
Band-rumped Storm-Petrel	BRSP
Bulwer‘s Petrel	BUPE
Christmas Shearwater	CHSH
Sooty Tern	SOTE
White-tailed Tropicbird	WTTR
Red-tailed Tropicbird	RTTR
Red-footed Booby	RFBO
Brown Booby	BRBO
Brown Noddy	BRNO
Black Noddy	BLNO
Unknown	UNK

Fraction of the Moon Illuminated, 2017 at Midnight
Hawaii-Aleutian Standard Time (*Source*: U.S. Naval Observatory, Naval Oceanography Portal at usno.navy.mil).

September		**October**		**November**	
Date	Fraction	Date	Fraction	Date	Fraction
1	0.78	1	0.80	1	0.90
2	0.85	2	0.87	2	0.95
3	0.91	3	0.93	3	0.99
4	0.96	4	0.98	4	1.00
5	0.99	5	1.00	5	0.98
6	1.00	6	0.99	6	0.93
7	0.98	7	0.96	7	0.86
8	0.95	8	0.91	8	0.77
9	0.89	9	0.83	9	0.66
10	0.80	10	0.73	10	0.55
11	0.71	11	0.63	11	0.44
12	0.60	12	0.51	12	0.33
13	0.48	13	0.40	13	0.24
14	0.37	14	0.29	14	0.16
15	0.26	15	0.20	15	0.09
16	0.17	16	0.12	16	0.04
17	0.09	17	0.06	17	0.01
18	0.04	18	0.02	18	0.00
19	0.01	19	0.00	19	0.01
20	0.00	20	0.01	20	0.04
21	0.02	21	0.03	21	0.08
22	0.05	22	0.07	22	0.13
23	0.11	23	0.12	23	0.20
24	0.18	24	0.19	24	0.29
25	0.26	25	0.27	25	0.38
26	0.34	26	0.36	26	0.47
27	0.43	27	0.45	27	0.57
28	0.53	28	0.55	28	0.67
29	0.62	29	0.64	29	0.77
30	0.71	30	0.74	30	0.85
		31	0.82		

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 stroage and later disposal.

Prepared by H. T. Harvey & Associates. Preliminary results, subject to further analysis and reporting.

Port Allen

Carcass ID	Map Point	Date	Coordinates		Trial #	Finder 1	Finder 2	Found Y/N	Comments
PA-SEEF-2017-01	1	10-Dec	21.90005	-159.587609	2	PUB		Y	Delivered to Hanapepe FS Aid Station
PA-SEEF-2017-02	2	10-Dec	21.900063	-159.588182	2	PUB		Y	Delivered to Hanapepe FS Aid Station
PA-SEEF-2017-03	3	10-Dec	21.900162	-159.588028	2	PUB		Y	Delivered to Hanapepe FS Aid Station
PA-SEEF-2017-04	4	10-Dec	21.8995	-159.589567	2	HTH		Y	HTH found and left in place, not reported by PUB, delivered by HTH to NAW Aid Station
PA-SEEF-2017-05	5	12-Dec	21.90019	-159.587842	4	HTH		Y	HTH found and left in place, not reported by PUB, delivered by HTH to NAW Aid Station
PA-SEEF-2017-06	6	12-Dec	21.899912	-159.588171	4	PUB		Y	Charter operator found and called in; delivered to Hanapepe
PA-SEEF-2017-07	7	15-Dec	21.900258	-159.587909	5	HTH		Y	HTH found and left in place, not reported by PUB, delivered by HTH to NAW Aid Station
PA-SEEF-2017-08	8	15-Dec	21.899537	-159.589451	5	HTH		Y	HTH found and left in place, not reported by PUB, delivered by HTH to NAW Aid Station
PA-SEEF-2017-09	9	21-Dec	21.90015	-159.588237	6			N	Not reported; recovered by HTH, delivered to SOS
PA-SEEF-2017-10	10	21-Dec	21.900176	-159.588192	6			N	Not reported; missing
PA-SEEF-2017-11	11	21-Dec	21.899429	-159.589705	6	PUB		Y	Charter operator found and reported to HTH; HTH delivered to SOS
PA-SEEF-2017-12	12	21-Dec	21.900216	-159.588292	6			N	Not reported; recovered by HTH and deposited SOS
PA-SEEF-2017-13	13	23-Dec	21.899616	-159.589192	7	PUB		Y	Charter operator found and reported to HTH; KESRP facilitates SOS delivery
PA-SEEF-2017-14	14	23-Dec	21.89996	-159.587479	7			N	Not reported; recovered by HTH and delivered to SOS
PA-SEEF-2017-15	15	23-Dec	21.900214	-159.587517	7			N	Not reported; recovered by HTH and delivered to SOS

Summary of Findings	Date	# carcasess	# found	discov	% detection
PUB and HTH	**10-15 Dec**	**8**	**8**	**1.00**	**100%**
PUB OVERALL	**10-23 Dec**	**15**	**6**	**0.40**	**40%**

Nawiliwili Harbor

Carcass ID	Map Point		Coordinates		Trial Number	Finder 1	Finder 2	Found Y/N	Comments
NAW-SEEF-2017-01	1	9-Dec	21.953461	-159.358987	1	DOT		Y	Security found before HTH survey; picked up by SOS
NAW-SEEF-2017-02	2	9-Dec	21.95523	-159.355459	1	DOT		Y	Security found before HTH survey; picked up by SOS
NAW-SEEF-2017-03	3	9-Dec	21.955823	-159.354779	1	DOT		Y	Security found before HTH survey; picked up by SOS
NAW-SEEF-2017-04	4	9-Dec	21.956931	-159.352877	1	DOT		Y	Security found before HTH survey; picked up by SOS
NAW-SEEF-2017-05	5	10-Dec	21.952335	-159.359586	2	DOT		Y	Security found before HTH survey; picked up by SOS
NAW-SEEF-2017-06	6	10-Dec	21.952444	-159.359747	2	DOT		Y	Security found before HTH survey; picked up by SOS
NAW-SEEF-2017-07	7	10-Dec	21.955327	-159.354609	2	DOT		Y	Security found before HTH survey; picked up by SOS
NAW-SEEF-2017-08	8	10-Dec	21.953915	-159.35306	2	DOT		Y	Security found before HTH survey; picked up by SOS
NAW-SEEF-2017-09	9	11-Dec	21.954676	-159.356554	3	DOT		Y	Security found in morning; picked up by SOS; not found by HTH
NAW-SEEF-2017-10	10	11-Dec	21.95277	-159.359522	3	DOT		Y	Security found before HTH survey; picked up by SOS
NAW-SEEF-2017-11	11	11-Dec	21.951353	-159.359032	3			N	Not reported; missing. Young Brothers yard not searchable by HTH due to operations.
NAW-SEEF-2017-12	12	11-Dec	21.956127	-159.354013	3	DOT		Y	Security found before HTH survey; picked up by SOS
NAW-SEEF-2017-13	13	12-Dec	21.95552	-159.355203	4	HTH	DOT	Y	Found by HTH and left in place; found by Security; placed in NAW Aid Station, picked up by SOS
NAW-SEEF-2017-14	14	15-Dec	21.954205	-159.357523	5	DOT		Y	Security found before HTH survey; picked up by SOS
NAW-SEEF-2017-15	15	15-Dec	21.957086	-159.355042	5			N	Not reported; missing.
NAW-SEEF-2017-16	16	15-Dec	21.955275	-159.355279	5	DOT		Y	Security found before HTH survey; picked up by SOS
NAW-SEEF-2017-17	17	15-Dec	21.955775	-159.354851	5	DOT		Y	Security found before HTH survey; picked up by SOS
NAW-SEEF-2017-18	18	21-Dec	21.957185	-159.353456	6	DOT		Y	Security found; picked up by HTH and delivered at SOS; carcasses were previously used, frozen, and reused (NAW-07, PA-05 and PA-06)
NAW-SEEF-2017-19	19	21-Dec	21.951449	-159.358828	6	DOT		Y	Security found; picked up by HTH and delivered at SOS
NAW-SEEF-2017-20	20	21-Dec	21.95668	-159.353553	6	DOT		Y	Security found; picked up by HTH and delivered at SOS

Summary of Findings	Date	# carcasess	# found	Discov	% Detected
DOT and HTH	9-15 Dec	17	15	0.88	88%
DOT OVERALL	9-23 Dec	20	18	0.90	90%

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

Lihue Airport				
Date	Location	Species	Time	Condition
13-Oct	LIH	NESH	19:45	A
26-Oct	LIH	NESH	6:00	D
26-Oct	LIH	NESH	7:40	A
4-Nov	LIH	NESH *	21:25	D
13-Nov	LIH	WTSH	11:00	A
16-Nov	LIH	WTSH	19:30	A

Nawiliwili Harbor				
Date	Location	Species	Time	Condition
12-Oct	NAW	NESH	21:15	A
12-Nov	NAW	WTSH	20:10	A
13-Nov	NAW	WTSH	20:50	A
15-Nov	NAW	WTSH	18:50	A
16-Nov	NAW	WTSH	21:20	D
16-Nov	NAW	STPE †	16:21	D
19-Nov	NAW	HAPE	21:15	A
20-Nov	NAW	WTSH	20:15	A
1-Dec	NAW	WTSH	20:40	A

Port Allen				
Date	Location	Species	Time	Condition
No downed birds discovered				

* 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.

Appendix E. FallOut Records for Covered Seabirds at Hawaii Department of Transportation Facilities on Kauai, 2013-2017

SOS Fall Out Records for Covered Seabirds at Hawaii Department of Transportation Facilities on Kauai, 2013-2016

ID	LogDate	LogType	Species	Status	PermBand	LocationFound	AidStation	Section	AgeClass	Port Allen HDOT	Nawiliwili HDOT	LIH HDOT
MLP011	10/12/2013	Aid Station	NESH	REL	1054-27392	Taxiway A @ Taxiway L intersection (airport)	Lihue Airport	11	HY			NESH
JMG010	10/15/2013	Aid Station	NESH	REL	1064-00594	Matson, vicinity of gate 14 located in the young brothers shipyard. Bird found sitting on the pavement.	Matson	13	HY		NESH	
JMO018	10/30/2013	Aid Station	NESH	REL	1054-27461	Nawiliwili Harbor	Lihue Fire Station	13	HY		NESH	
MLP026	10/31/2013	Aid Station	NESH	REL	1054-31632	Between commuter terminal and grassy area near storm drain. Airport	Lihue Airport	11	HY			NESH
MK409	10/16/2014	Aid Station	NESH	REL	1064-00757	Port Allen Pier	Hanapepe Fire Station	21	HY	NESH		
CMD032	10/28/2014	Aid Station	NESH	REL	1064-00934	Found outside Terminal Building	Matson	13	HY		NESH	
ELC025	11/16/2014	Secondary Pickup	NESH	DOA		"Young Brothers, Pier 3, #15 pole, 11/15/2014, (Matson)"	OTHER	13	U		NESH	
MJ183	10/7/2015	Aid Station	NESH	REL	1064-01072	Hanapepe Harbor, near pier	Kalaheo Fire Station	21	HY	NESH		
JS002	10/10/2015	Aid Station	NESH	REL	1064-01185	Port Allen Pier roadside, 3:30 pm	Hanapepe Fire Station	21	HY	NESH		
TA423	10/13/2015	Aid Station	NESH	REL	1064-01076	Front of Matson Building, 3rd door @ 20:30	Matson	13	HY		NESH	
NS012	10/14/2015	Aid Station	NESH	REL	1064-01096	"Port Allen on the pier 8:15"	Kalaheo Fire Station	21	HY	NESH		
NS020	10/19/2015	Aid Station	NESH	REL	1064-01172	"Port Allen DOT pier"	Hanapepe Fire Station	21	HY	NESH		
NS024	10/20/2015	Aid Station	NESH	REL	0864-06001	"Port Allen pier"	Kalaheo Fire Station	21	HY	NESH		
TA432	10/22/2015	Aid Station	NESH	REL	0864-06014	Tiger Pier @ 9pm 10/21/15	Matson	13	HY		NESH	
UMP170	10/28/2016	Aid Station	NESH	REL	1064-02129	Holo Holo Charters, Port Allen Commercial Pier 17:20 10/27	Hanapepe Fire Station	21-PA	HY	NESH		

ID	LogDate	LogType	Species	Status	PermBand	LocationFound	AidStation	Section	AgeClass	Port Allen HDOT	Nawiliwili HDOT	LIH HDOT
HDOT Monitoring Program Results for 2017												
HTHarvey	10/12/2017	Monitoring	NESH	Alive	?	Nawiliwili Harbor	?	13	HY		NESH	
HTHarvey	10/13/2017	Monitoring	NESH	Alive	?	Lihue Airport	?	11	HY			NESH
HTHarvey	10/26/2017	Monitoring	NESH	Dead	?	Lihue Airport	?	11	HY			NESH
HTHarvey	10/26/2017	Monitoring	NESH	Alive	?	Lihue Airport	?	11	HY			NESH
HTHarvey	11/4/2017	Monitoring	NESH	Dead	?	Lihue Airport	?	11	U			NESH
HTHarvey	11/19/2017	Monitoring	HAPE	Alive	?	Nawiliwili Harbor	?	13	HY		HAPE	
SOS Monitoring Results (New) for 2017												
SOS New	11/17/2017	11-Lihue-Airport Area	NESH			Lihue Airport		11				NESH
SOS New	11/17/2017	11-Lihue-Airport Area	NESH			Lihue Airport		11				NESH
SOS New	10/14/2017	13-Matson/ Nawiliwili Harbor	NESH			Matson Container near wht tent area @ 2357 10/13		13			NESH	
SOS New	10/26/2017	13-Matson/ Nawiliwili Harbor	NESH			Pier 1 Apron @ 816 on 10/26		13			NESH	
SOS New	10/14/2017	21-Port Allen	NESH			Port Allen Pier		21		NESH		
SOS New	10/22/2017	21-Port Allen	NESH			Port Allen Pier		21		NESH		
SOS New	10/23/2017	21-Port Allen	NESH			Port Allen Pier about 0830. Found struggling in water by Holo Holo trying to get onto pier.		21		NESH		
						Total Period 2013 - 2017 - NESH				10	9	8
						Total Period 2013 - 2017 - HAPE				0	1	0
						Annual Average 2013-2017 - NESH				2	1.8	1.6

15 Year HAPE Fallout Records		
HAPE Fallout Record 2003^	1	
HAPE Fallout Record 2004		1
HAPE Fallout Record 2007		1

HAPE Fallout Record 2008^	1	
HAPE Fallout Record 2012		1
HAPE Fallout Record 2017	1	
15 year total (2003-2017)	3	3
15 year Annual Average (2003-2017)	0.2	0.2

^Note: Assume the HAPE fallout in 2003, 2008 occurred at Nawiliwili, pending further data

15 Year BRSP Fallout Records

BSRP Fallout Record 2007	1
15 year total (2003-2017)	1
15 year average (2003-2017)	0.07

Comparison of Seabird Monitoring Procedures at Lihue Airport and Nawiliwili Harbor
Hawaii Department of Transportation
For the 2017 Seabird Fallout Season

Seabird Monitoring Program at Lihue Airport 2017	Seabird Monitoring Program at Nawiliwili Harbor 2017
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 involving 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.

Seabird Monitoring Program at Lihue Airport 2017	Seabird Monitoring Program at Nawiliwili Harbor 2017
The seabird monitoring program at Lihue Airport included the following components.	The seabird monitoring program at Nawiliwili Harbor included the following components.
1. Entities involved in seabird monitoring and response at Lihue Airport.	1. Entities involved in seabird monitoring and response at Nawiliwili Harbor.
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.	a. H. T. Harvey & Associates staff[2]. H. T. Harvey & 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 & Associates monitoring staff also provided seabird awareness and response information to harbor staff and tenants.
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.	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 & Associates monitoring staff.

[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	Seabird Monitoring Program at Nawiliwili Harbor 2017
c. HDOT airport security[5]. They conducted daily and nightly surveys and patrolled public access areas of the airport, including access roads, public parking lots, terminals, and airport buildings.	c. HDOT harbor security[6]. They completed daily and nightly surveys and patrolled secure parts of the harbor, including terminals, the container yard, buildings, and roadways.
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.	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.
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.	
2. Seabird species monitored	2. 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*).	a. The seabirds covered in the monitoring program are the Newell's shearwater, Hawaiian petrel, band-rumped storm-petrel, and wedge-tailed shearwater.
3. Percentage of total property and total area that were searched.	3. 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	a. H. T. Harvey & Associates 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;

[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)

Seabird Monitoring Program at Lihue Airport 2017	Seabird Monitoring Program at Nawiliwili Harbor 2017
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-lighted areas that were not visible from a vehicle.	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.
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.	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.
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.	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.
d. H. T. Harvey & 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	

Seabird Monitoring Program at Lihue Airport 2017	Seabird Monitoring Program at Nawiliwili Harbor 2017
searched from a vehicle by driving slowly along the access roads between the main lighted areas.	
4. Frequency of searches	4. Frequency of searches
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.	a. H. T. Harvey & Associates staff conducted one nightly search of the harbor facility that consisted of approximately 1–2 hours of on-site surveillance.
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.	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.
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.	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.
d. H. T. Harvey & 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.	
5. Time of day of searches	5. Time of day of searches
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.	a. H. T. Harvey & Associates staff conducted a nightly search of the harbor in the evening between 7:00–11:00 p.m.

Seabird Monitoring Program at Lihue Airport 2017	Seabird Monitoring Program at Nawiliwili Harbor 2017
b. HDOT airport operations staff conducted rounds a minimum of twice per day, once at 10:00 a.m., and again in the evening, 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.	b. HDOT harbor operations staff performed rounds of the harbor 1 or 2 times per day between 7:45– 4:30 p.m.
c. HDOT airport security staff, who are on duty 24 hours per day, and completed hourly rounds of the public access areas of the airport throughout the day and night.	c. HDOT harbor security staff, who are on duty 24 hours per day, conducted regular hourly rounds of the harbor throughout the day and night.
d. H. T. Harvey & Associates staff conducted a nightly search of secure and public access areas of the airport in the evening between 7:00–11:45 p.m.	
6. Number of searchers per search area	6. Number of searchers per search area
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.	a. H. T. Harvey & Associates surveys of the harbor were conducted by one staff person.
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.	b. HDOT harbor operations searches were completed by one staff person, who conducted harbor rounds and searched for operational hazards, including downed seabirds.
c. HDOT airport security 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.	c. HDOT harbor security conducted hourly rounds with one staff person throughout the day and night.
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.	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.
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.	
f. H. T. Harvey & Associates' surveys typically entailed having one searcher cover the airport; however, two searchers were	

Seabird Monitoring Program at Lihue Airport 2017	Seabird Monitoring Program at Nawiliwili Harbor 2017
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.	7. Data Collection and Reporting a. 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 (whether alive, injured, injured, or dead), characteristics of nearby lighting, and the distance to lights or nearby structures. These observations were entered into a spreadsheet. A downed wildlife report form was completed and used to report incidents to WS, 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 collected 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.	b. HDOT harbor security reported incidents of downed seabirds to H. T. Harvey & Associates monitoring staff (if present) to respond, or responded directly as needed. If processing on their own, harbor security personnel completed an incident report form that was provided to H. T. Harvey & Associates monitoring staff, harbor operations, and the Kauai SOS program.
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.	8. Training a. H. T. Harvey & Associates provided briefings and seabird awareness fact sheets to harbor staff, security, and tenants.
b. H. T. Harvey & Associates provided seabird awareness fact sheets to airport staff, security, and tenants.	b. HDOT Harbor Security received a briefing prior to the start of the seabird fallout season from the Kauai SOS program, which also established an on-site aid station.

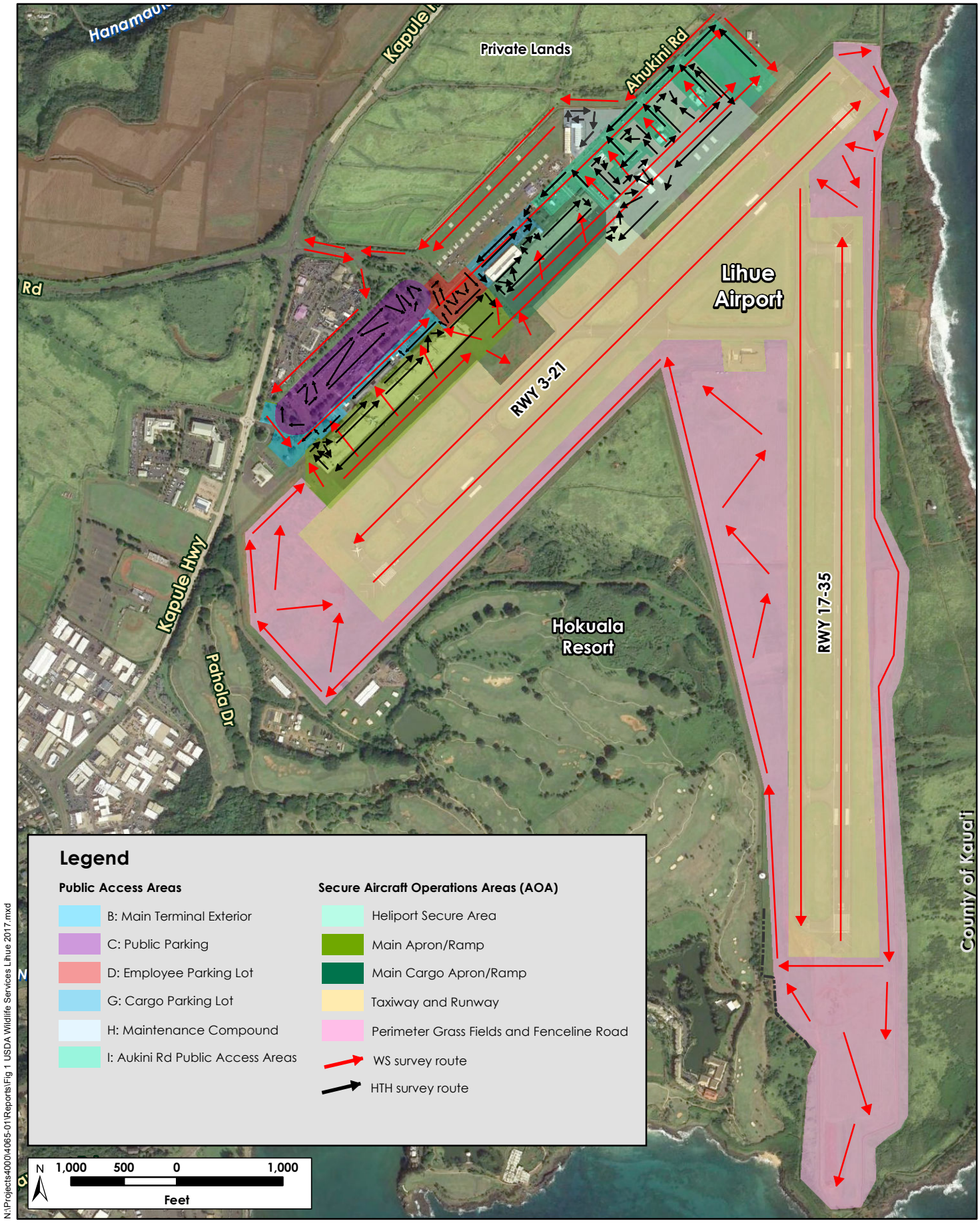
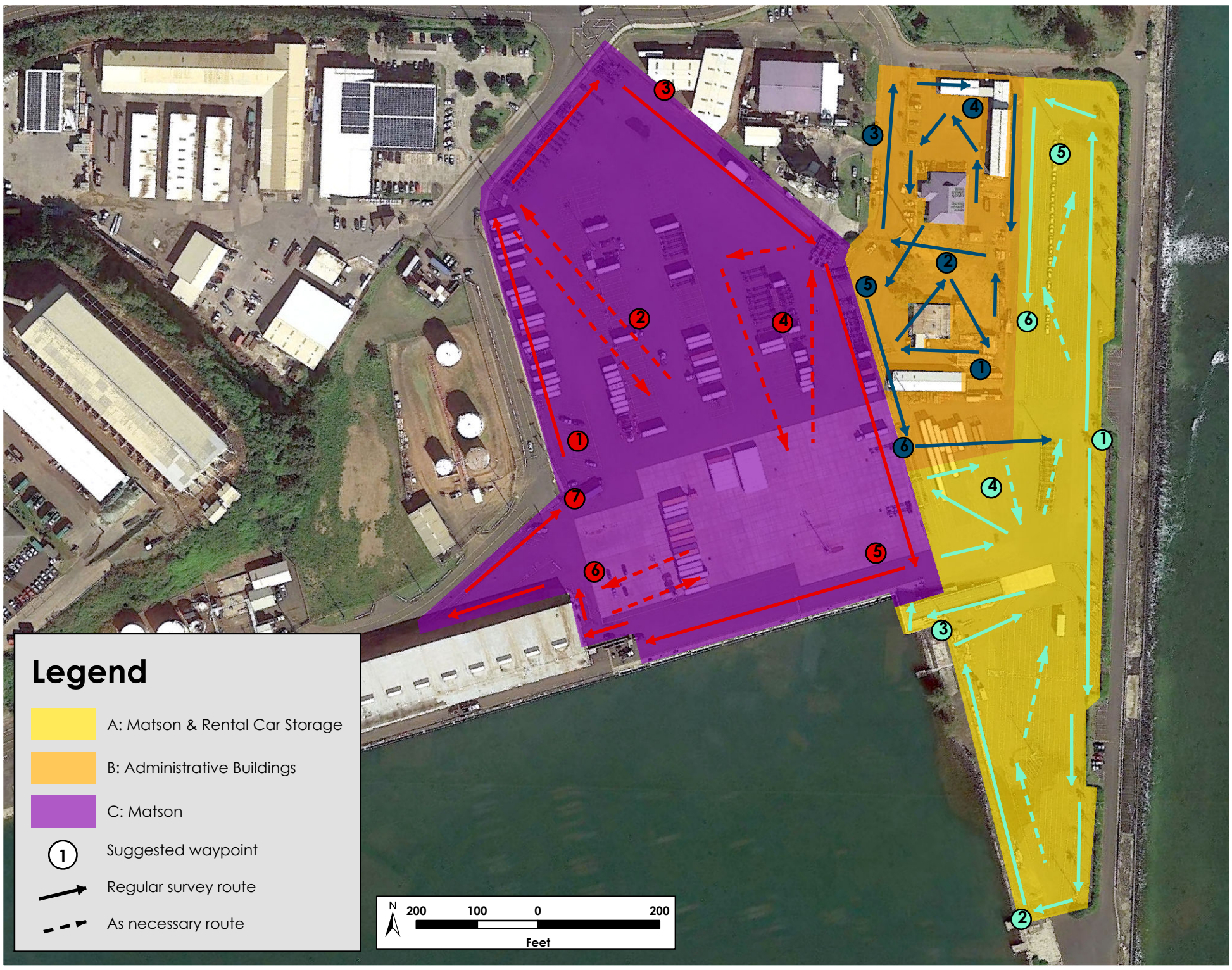


Figure 1. Seabird Monitoring Routes in Public Access and Secure Areas of Lihue Airport

Lihue Airport (4065-01)

December 2018



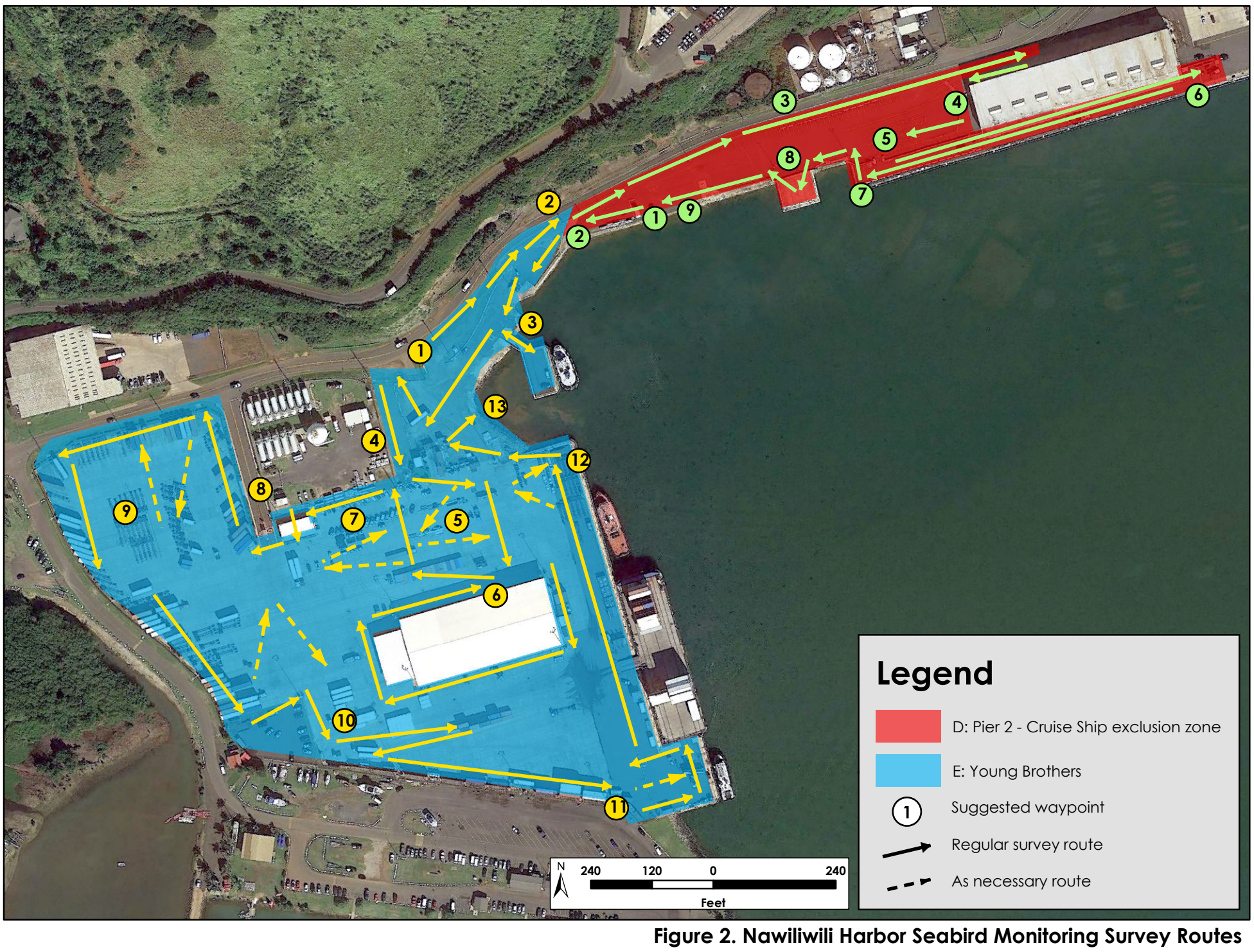


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Figure 2. Nawiliwili Harbor Seabird Monitoring Survey Routes

4065-01
January 2018

Kaua‘i Seabird Habitat Conservation Program (KSHCP)

Participant Inclusion Plan (PIP) Template

Name of Applicant/Participant

Kauai Coffee Company, LLC

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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
Email: lquier@mzb-usa.com
Telephone: (757) 538-4123

Alternate Contact: Name: Fred Cowell
Address: P.O. Box 530, Kalaheo, HI 96741
Telephone: (808) 335-3440
Email: fcowell@kauaicoffee.com

Preparer Contact: Name: Dan Peck
Address: P.O. Box 530, Kalaheo, HI 96741
Email: DPeck@kauaicoffee.com
Telephone: (808) 482-2169; (808) 634-9484

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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.

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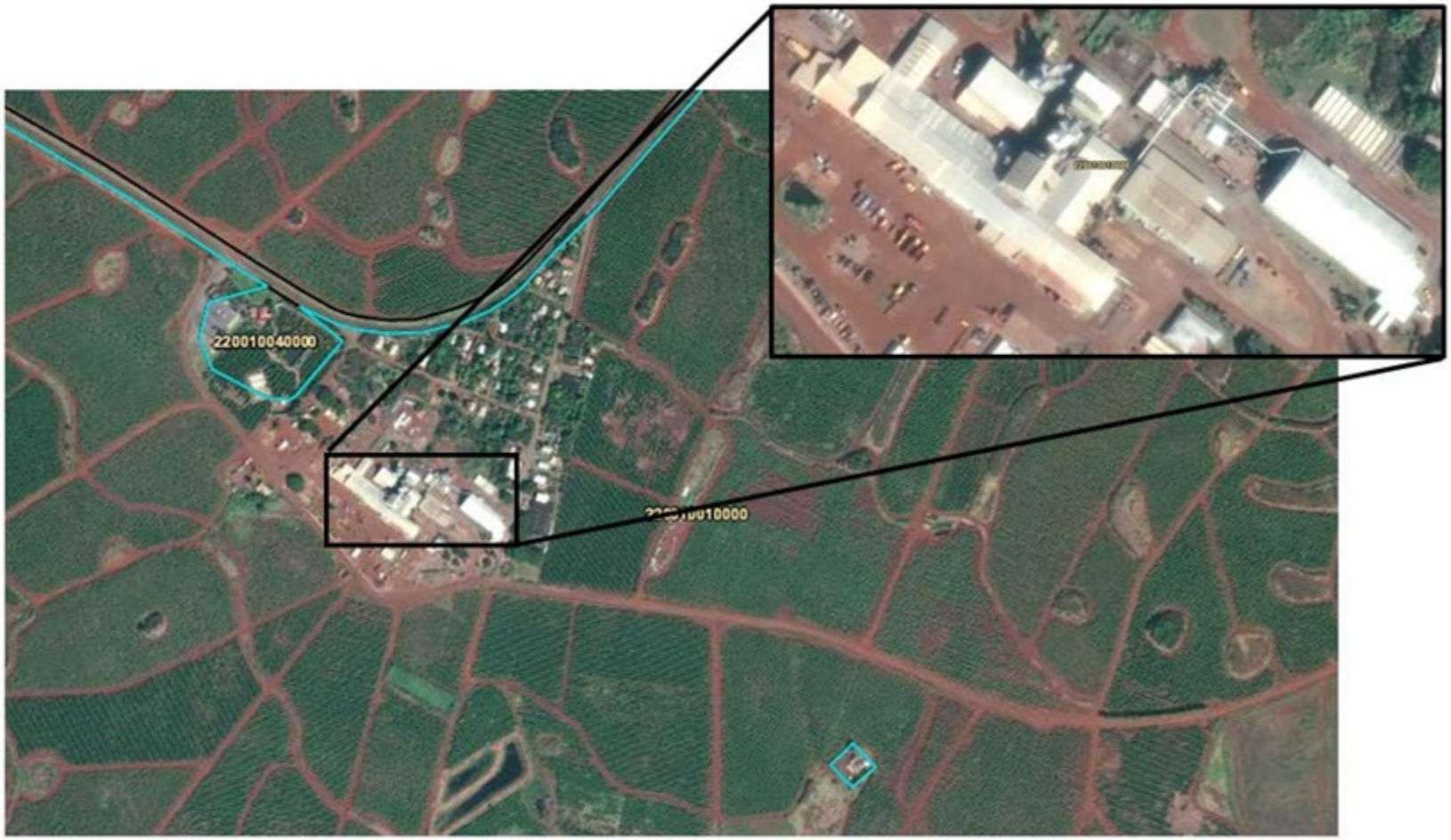
Kauai Coffee Co., LLC Covered Activity TMK Parcels

1.	(4) 2-1-001: 001	8.	(4) 2-2-001: 004
2.	(4) 2-1-001: 003	9.	(4) 2-2-001: 007
3.	(4) 2-1-001: 027	10.	(4) 2-3-010: 001
4.	(4) 2-1-001: 035	11.	(4) 2-3-010: 010
5.	(4) 2-1-001: 036	12.	(4) 2-3-010: 011
6.	(4) 2-1-001: 037	13.	(4) 2-3-010: 012
7.	(4) 2-2-001: 001	14.	(4) 2-6-003: 001

Kauai Coffee Co., LLC Processing Operations Area
TMK# (4) 2-2-001: 001



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.

- 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.

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List of Buildings	Type/Description of Lights Present	Location	Purpose of the Lights	Describe any measures implemented to avoid or minimize take impacts to Covered Species
	Parking lot pole light mounted on structure/bldg: 150W Mercury vapor (white)	Wet Plant	Safety & Security	Direction of Light angle is down & out
		Pre Dryers	Safety & Security	Direction of Light angle is down & out
		Dryer Bins	Safety & Security	Direction of Light angle is down & out
		Waste Plant	Safety & Security	Direction of Light angle is down & out
		Vert Dryer 1	Safety & Security	Direction of Light angle is down & out
		Berico 14/15	Safety & Security	Direction of Light angle is down
	Parking lot pole light	Field Office	Safety & Security	Direction of Light angle is down
	Parking lot pole light			
Wall-pack building lights:	150W HiPresSodium	ADS Entry	Safety & Security	Direction of Light angle is down & out
	100W Mercury vapor	Field Office	Safety & Security	Direction of Light angle is down & out
	100W Metal Halide	Berico MCC	Safety & Security	Direction of Light angle is down & out
	100W HiPresSodium	Visitor Center	Safety & Security	Direction of Light angle is down & out
	175W HiPresSodium	Admin/Roast	Safety & Security	Direction of Light angle is down & out
	400W Metal Halide	Factory Office	Safety & Security	Direction of Light angle is down & out
	150W HiPresSodium	Electric Shop	Safety & Security	Direction of Light angle is down & out
	400W Metal Halide	Equip Shop	Safety & Security	Direction of Light angle is down & out
	400W Metal Halide	Kanani Mill	Safety & Security	Direction of Light angle is down & out
	400W Metal Halide	Pali Uli Mill	Safety & Security	Direction of Light angle is down & out
Roof flood lights:	60W Par Halogen	Field Office	Safety & Security	Direction of Light angle is down & out
	60W Par Halogen	Visitor Center	Safety & Security	Direction of Light angle is down & out
	100W CFL	Equip Shop	Safety & Security	Direction of Light angle is down; and full cut-off/shielded fixture
	60W Par Halogen	Carpenter Shop	Safety & Security	Direction of Light angle is down & out
	60W Par Halogen	Carpenter Shop	Safety & Security	Direction of Light angle is down & out
	60W Par Halogen	Carpenter Shop	Safety & Security	Direction of Light angle is down & out
	60W Par Halogen	Carpenter Shop	Safety & Security	Direction of Light angle is down & out
Other lights: Warehouse LED-Motion	400W Metal Halide	Wet Plant Field	Safety & Security	Direction of Light angle is down
Wall Lantern LED	20W LED	Office Visitor Center	Safety & Security	Direction of Light angle is down & out
	100W CFL	Visitor Center	Safety & Security	Direction of Light angle is down & out
	20W LED	Visitor Center	Safety & Security	Direction of Light angle is down & out
Street Light on Building Wall	150W Mercury vapor	Visitor Center	Safety & Security	Direction of Light angle is down & out
Mounted Jelly Jar LED Motion LED	100W CFL	Admin/Roast	Safety & Security	Direction of Light angle is down & out
	20W LED	Admin/Roast	Safety & Security	Direction of Light angle is down & out
Security Shack	40W LED	Fuel Station	Safety & Security	Direction of Light angle is down
	150W HiPresSodium	Security	Safety & Security	Direction of Light angle is down & out
Other Lights-Harvest Operations:				

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Korvans (14)	35W Halogen-200L	Harvester	Safety & Operation	Direction of Light angle is down & out
Korvan (1)	180W LED-10K-L	Harvester	Safety & Operation	Direction of Light angle is down & out
	18W LED	Harvester	Safety & Operation	Direction of Light angle is down & out
Komatsu Loader	180W LED-10K-L	Loader	Safety & Operation	Direction of Light angle is down & out
	18W LED	Loader	Safety & Operation	Direction of Light angle is down & out
Hyundai Loader Light Plant	3,200L Halogen 1250W	Loader	Safety & Operation	Direction of Light angle is down & out
	Metal Halide 150K-L	Light Plant	Safety & Operation	Direction of Light angle is down & out

Table 1: Lighting at Facilities

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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.		
Are any of the facilities located adjacent to a beach?	**Yes / No** **<u>N/A</u>**	**If yes, provide length of beach frontage & brief description of facilities & lights adjacent to the beach**
Are any of the Covered Activities (lights) visible from a beach?	**Yes / No** **<u>N/A</u>**	**If yes, describe the specific lights (type, , height, purpose) & specific location; provide map & photos showing distance from beach**
Have green sea turtles been known to nest on any beaches adjacent to the facilities?	**Yes / No** **<u>N/A</u>**	**If yes, provide information about nesting occurrences, if known, including location and date and any other information**

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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.

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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.

None.

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Item 6. Pursuant to the Endangered Species Act (ESA), Section 10 (a)(2)(A)(iii), describe alternatives to <u>avoid</u> 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.

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Table 3: Light Attraction Alternatives to the Taking

Artificial Light Attraction Alternatives to the Taking Considered	Reasons Alternatives are not Being Utilized (provide justification)
▪ Deactivate all outdoor artificial lights from dusk to dawn during the fledgling fall-out season September 15 to December 15	Harvest operations curtailed from sunset + 4 hours during new moon.
▪ Change operations to eliminate the need for outdoor artificial lighting (e.g., from nighttime to daylight hours)	See above
▪ 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)	N/A
▪ Other alternatives to the taking considered, if any. If facility is proposed, include alternative designs considered	

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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.

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Table 4: Seabird Light Attraction Minimization Measures Considered

Minimization Measures Considered	Feasible? (Y / N)	If not Feasible to Implement Measures, Provide Reason
▪ **Change time of light use (lights off earlier)**	**Yes**	
▪ **Deactivate unnecessary lights**	**Yes**	
▪ **Replace all outdoor lights with full cut-off fixtures**	**Yes**	Where cost effective or otherwise will install shields
▪ **Shield all outdoor lights with full cut-off shields**	**Yes**	Fabrication and installation of full cut off shields where needed in progress
▪ **Angle all lights downward**	**Yes**	
▪ **Lower intensity (lumens) of outdoor lights**	**Yes**	
▪ **Change bulb color to non-white spectrum**	**Yes**	Change out program in progress
▪ **Prohibit/control unleashed predatory animals; prohibit outdoor feeding of animals; require sealed rubbish containers**	**Yes**	
▪ **Provide Worker Seabird Awareness Training to staff**	**Yes**	
▪ **Provide outreach materials to staff & guests**	**Yes**	
▪ **Host Save Our Shearwaters (SOS) Aid Station**	**No**	Not suitable for private property/agricultural operations.

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Item 8. <u>Minimization Plans</u>. 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.

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Table 5: Lighting Minimization Measures

List of Buildings	Minimization Measures	Cost to Implement	Responsible Staff	Timeline
Parking lot lights (2)	Minimization Measures 1. Down-direct all parking lot lights (in place-existing)	$0	General Manager;	8 November 2016
Signage Lights (0)	Not Applicable	NA	General Manager;	NA
Wall-pack lights (40)	Minimization Measures 1. Wall-packs are down-directed full cut-off & shielded fixtures. Shield installation in progress for lights without shields.	$8,000	General Manager;	August 2017
Landscaping & grounds lighting (0)	Not Applicable	NA	General Manager;	NA
Other Lights (25)	Minimization Measures 1.LED Motion Activated – Down Facing 2.Jelly Jar – Out and Down Facing 3. Factory Light at Wet Plant Receiving – Down Facing	$0	General Manager;	8 November 2016
Operations (7, 1, 5) Harvest Operations (84) (5) (5) (4) (4)	Minimization Measures 1. Remove & control on-site presence of loose predatory animals 2. Prohibit outdoor feeding of animals 3. Recover downed birds found on property & turn into SOS 4. Train staff regarding minimization measures 5. Provide seabird outreach to Inform guests and visitors 6. Deactivated: Milling wall packs, Eq.Shp street light, Visitor floods 7. 14.Korvan Harvesters – (6) 35W halogen 200 lumens/lamp 8. Korvan – 180W LED Light Bar, (2) 18W Small LED, (2) 35W halogn 9.Komatsu Loader – 180W LED Light Bar, (4) 18W LED 10.Hynndai Loader – Halogen Lamp 3,200 Lumens (4) 11.Light Plants – (4) 1,250W metal halide 150,000 Lumens	$10,000	General Manager;	Items 1-5 30 November 2016

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Table 6: Seabird Mortality Minimization Plan

Minimization Measures	Describe minimization method (e.g. trapping, outreach, enact policy)	Cost to Implement	Responsible Staff
Remove & control loose predatory animals at the facility. (Loose animals can kill grounded seabirds and this measure aims to prevent seabird mortality by animals.)	Trapping of feral cats. Factory area 2 traps checked daily multiple times throughout the day.	$200.00 per month	General Manager; Department Manager, Safety 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.)	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.	N/A	General Manager; Department Manager, Safety Manager
Conduct nightly/morning searches to recover downed birds at the property & turn them into SOS following protocols (see monitoring plan below).	Awareness through training of all shift personnel. Bird search integrated into shift change operations in harvesting and processing.	N/A	General Manager; Field and Factory Supervisors and Managers, Safety Manager
Train staff to follow minimization measures.	Yes.	N/A	General Manager; Safety Manager

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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.

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Table 7: Covered Seabird Take Monitoring Protocols

Please provide the following information for the protocol items below		
Item	**Protocol** (fill in protocol & provide reasons)	**KSHCP Guideline**
Percentage of the total property that will be searched & the total area to be searched	Search, recovery, reporting at all shift changes for all lighted areas.	Search as much area as possible
Frequency of searches (# per day or per week)	Twice per day.	Twice daily
Time of day of searches	5:30 PM and 5:30 AM	2-3 hours after sunset, and within 3 hours after sunrise
Number of searchers per search area	Harvesting = 10 Processing = 20	Depends on site conditions and safety considerations and vegetation, nearby hazards/threats
Proposed training	Annual training per guidelines (already being done).	Annual training covering seabird identification, seabird handling, response procedures, verified and documented

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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).

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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)		
Item	**Protocol** (fill in protocol & provide reasons)	**KSHCP Guideline**
Location & description of the beach, or beaches, surveyed and the linear distance of the beach		Beach area surveyed should coincide with visibility from the facility with the lights
Frequency of searches (# per day or per week)		Weekly during nesting season (typ. May 15 to end of August)
Number of searchers per search area		Depends on site conditions and safety considerations
Proposed training		Searchers should receive annual training conducted by the DLNR or the USFWS, or their designee (See **item 9a)**

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Table 9: Green Sea Turtle 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)		
Item	**Protocol** (fill in protocol & provide reasons)	**KSHCP Guideline**
Frequency of checks (# per day or per week)		Active nests should be monitored every 1-2 days; then daily during expected hatching date
Light avoidance		If lights cannot be deactivated or shielded from the nest, each nest should be screened from visible light
Number of searchers per search area		Depends on site conditions and safety considerations

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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; **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 (if applicable); **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, proper nest light screening, and hatchling activity (if green sea turtle minimization and monitoring plan is applicable); **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 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. **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.
10. Complete the Bird Take Field Report.
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

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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.

Item 12. Describe any outreach conducted (e.g., handing out pamphlets on seabird awareness to facility employees or guests, etc):

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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

	Newell's Shearwater	Hawaiian Petrel	Band-rumped Storm-petrel
1. Annual average number (SOS data – or – monitoring data) of downed NESH (5 most recent years), HAPE or BRSP (15 most recent years)	1	0	0
2. Annual observed lethal take estimate (12% of 1, all downed birds)	.12	0	0
3. Annual unobserved lethal take estimate (e.g. 100% of 1, all downed birds if 50% searcher efficiency assumed)	1	0	0
4. Total estimated annual lethal take from light attraction (2+3)	1.12	0	0
Requested Annual Lethal Take	1.12	0	0
Requested Take Over Permit Term	33.6	0	0

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Item 2. Select the requested take authorization and permit/license term coverage for each of the Covered Species.

Table 11: Newell's Shearwater:

Age Class	Annual Take Estimate: Fledglings	Annual Take Estimate: Adults or Sub-Adults	Take Limit for License/Permit Term
Mortality (Lethal)	1.12		33.6
Injury (Non-lethal)	0.88		26.4

Table 12: Hawaiian Petrel:

Age Class	Annual Take Estimate: Fledglings	Annual Take Estimate: Adults or Sub-Adults	Take Limit for License/Permit Term
Mortality (Lethal)	0	0	0
Injury (Non-lethal)	0	0	0

Table 13: Band-Rumped Storm Petrel:

Age Class	Annual Take Estimate: Fledglings	Annual Take Estimate: Adults or Sub-Adults	Take Limit for License/Permit Term
Mortality (Lethal)	0	0	0
Injury (Non-lethal)	0	0	0

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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.

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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 – Kauai Coffee Lighting Pictures (PDF file included)

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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

Kaua‘i Seabird Habitat Conservation Program (KSHCP)

Participant Inclusion Plan (PIP)

Essex House Condominium Corporation, an affiliate of Marriott International, Inc. (Kaua‘i Marriott Resort, Lihue)

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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:	Essex House Condominium Corporation, an affiliate of Marriott International, Inc. (herein "Kaua'i Marriott Resort")
Physical Address/Location of Facility:	3610 Rice Street, Lihue, HI 96766
Mailing Address:	Same as above
Primary Contact:	
Address:	
Telephone:	
Email:	
Alternate Contact:	
Address:	
Telephone:	
Email:	
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

Email: 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: davidr003@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.

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Table 1: Outdoor Lighting at Kaua'i Marriott Resort

Light Type Make and Model	Wattage/rating	Bulb Color	Quantity	Location	Purpose	Cut-off or Shielded Fixture	Light angle (down, out, up)	Visible from Beach (yes/no)
Parking lot pole lights								
Stonco /Flood	150w HPS-High Pressure Sodium	2100k	33	Employee. Valet/Haupu	Parking lot illumination	Yes	Down	No
Lithonia/ Flood	250w HPS	2200k	12	Valet and Guest Lots	Parking lot illumination	Yes	Down	No
Lithonia/ Flood	Q500-Quartz 500w	3000k	5	Service Road	Parking lot illumination	Yes	Down	No
Kim/Vista	45W incandescent	2700k	6	Service road	Parking lot illumination	Yes	Down	No
Lithonia/Flood	23w LED	5000k	9	Service Road, Dukes Pkg.	Parking lot illumination	Yes	Down	No
Antique Street Lights/ Flood	100w MH-Metal Halide	4000k	4	Associate Crosswalk	Pedestrian Safety	Yes	Down	No
Lithonia/Flood	250w MH	4000k	2	Dukes, Valet Pkg.	Pedestrian Safety	Yes	Down	No
Lithonia/Flood	114w LED	4000k	1	Haupu Parking - gravel	Pedestrian Safety	Yes	Down	No
Lithonia/Flood	13w LED	2700k	8	Pali Cottage Sidewalk	Pedestrian Safety	Yes	Down	No
RAB/Flood	40w LED	4000k	1	Lower Pali Kai	Pedestrian Safety	Yes	Down	Yes
Signage illumination								
Lithonia/ Flood	F032T8 Florescent 32w	4100k	1	Porte Cochere entry	Signage	No	Out, but low to ground	No

Kim Vista	13.5w LED Flood	2700 k	6	Rice Street sign	Signage	No	Out, low to ground	No
Light Type Make and Model	**Wattage/rating**	**Bulb Color**	**Quantity**	**Location**	**Purpose**	**Cut-off or Shielded Fixture**	**Light angle (down, out, up)**	**Visible from Beach (yes/no)**
Kim Vista	13.5w LED Flood	2700 k	18	Promenade/Beach/Main drive	Signage	No	Out, but low to ground	4 Yes (Dukes/Porto Fino signs on Promenade) 14 No
Electro Elf/ Flood	PL13 Florescent 13w	2700 k	3	Promenade/Beach	Signage	Yes	Down	Yes
Wall-pack building lights								
Lithonia/ Flood	Q500-Quartz 500w	3000 k	3	Bake shop ramp, Service Road	Building lights	Yes	Down	No
Electro Elf/ Flood	PL13 CFL 13w	2700 k	22	Aupaka's Planter, Dukes Walkway, Pool Hut, Service Road	Building lights	Yes, under eaves	Down	8 Yes (Aupaka's Planter – Distant)
Kim/Vista	13.5w LED Flood	2700 k	5	Dukes Parking, Service Rd	Building lights	Yes	Down	No
Lithonia/Flood	23w LED	4000 k	11	Service Road, Dukes Pkg., Garden	Building lights	Yes	Down	No
Lithonia/Flood	26w LED	4000 k	3	Security Entrance	Building lights	Yes	Down	No
Stonco/ Flood	100w HPS-High Pressure Sodium	2700 k	5	Dukes parking Storage buildings at the service road	Building lights	Yes	Down	No
Leviton Fluorescent	F17/T8	4100 k	24	In Stair handrails	Building lights	Yes	Down	Yes (Distant)

Landscaping & grounds accent floodlights								
Kim/Vista	2P3819 CFL 19w	2700k	127	Main & Haupu Drive	Landscape illumination; accent lighting	Shielded by thick vegetation	out	No
Kim/Vista	HR175-Mercury Vapor 175w	4000k	17	Promenade, Dukes, Kahili garden	Landscape illumination; accent lighting	Yes	Down	Yes
Kim/Vista	Par 38 13.5w LED Flood	2700k	17	Pool/ Promenade, beach, Dukes, Porte Cochere	Landscape illumination; accent lighting	No	Down, some up but shielded by vegetation	2 Yes 15 No
FEIT/String Lights	11w incandescent	2000k	100	Kukui's Patio Trees	accent lighting	Yes - vegetation	Out	Yes
Bollards								
Vista	LED 5w	4000k	24	Haupu Garden, Pool Deck	Pedestrian guidance & safety	Yes	Down	5 Yes 19 No
Electro Elf/ Flood	PL7 CFL 7w	2700k	11	Garden court, bridge, stairs	Pedestrian guidance & safety	Yes	Down	No
BQL/ Pagoda	20w Halogen	4000k	16	Kahili garden, Porte Cochere	Pedestrian guidance & safety	Yes	Down	No
Electro Elf/ Pagoda	PL13 CFL 13 w	4100k	20	Main Drive, Limo Pkg	Pedestrian guidance & safety	Yes	Down	No
Lithonia, Stonco/Flood	100wHPS High Pressure Sodium	2100k	3	Dukes bridge	Pedestrian guidance & safety	Yes	Down trees	Yes
Kim/Vista	Par30 10w Spot	3000k	8	Pool, Promenade Statues	Accent	Yes	Down	Yes
Bollards								
Stonco/Flood	Q500 Halogen	3000k	1	Eng. Service Road	Pedestrian Safety	Yes	Down	No

Lithonia/Flood	50w LED	4000k	2	BBQ area, Lower Pali Kai walkway	Pedestrian Safety	Yes	Down	No
Kim/Vista	Par38 13.5w LED	2700k	8	Kahili Garden	Pedestrian Safety and Accent	No - heavy vegetation	Out	No
Antique Street Lights	13w LED	2700k	4	Associate Crosswalk	Pedestrian guidance and safety	Yes	Out, Shielded by	No
Other Lights								
Lithonia/ Spot	120w Par 64 incandescent 6V	2700k	4	Promenade, garden	Statue spots	No	Down	2 Yes (Promenade) 2 No (Garden court)
Pentair, enclosed	13.5 LED	3000k	30	Pool lights in swimming pool	User Safety	No	Out	No

The above description of outdoor lighting is current as of December 2018. The Resort has minimized lighting to the maximum extent practicable.

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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.		
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** 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.
Are any of the Covered Activities (lights) visible from a beach?	**YES / No**	**If yes, describe the specific lights (type, , height, purpose) & specific location; provide map & photos showing distance from beach** See Table 1 above
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**

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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 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 <u>avoid</u> 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

Artificial Light Attraction Alternatives to the Taking Considered	Reasons Alternatives are not Being Utilized (provide justification)
▪ **Deactivate all outdoor artificial lights from dusk to dawn during the fledgling fall-out season September 15 to December 15**	Lighting is required for direction, safety, and security of the hotel grounds for guests, visitors, and employees.
▪ **Change operations to eliminate the need for outdoor artificial lighting (e.g., from nighttime to daylight hours)**	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.
▪ **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)**	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.
▪ **Other alternatives to the taking considered, if any. If facility is proposed, include alternative designs considered**	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.

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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.

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Table 4: Seabird Light Attraction Minimization Measures Considered

Minimization Measures Considered	Feasible? (Y / N)	If not Feasible to Implement Measures, Provide Reason
▪ **Change time of light use (lights off earlier)**	**YES / No**	Facility operates at all hours and grounds safety is required.
▪ **Deactivate unnecessary lights**	**YES / No**	
▪ **Replace all outdoor lights with full cut-off fixtures**	**YES / No**	Except very low to ground and shielded by vegetation.
▪ **Shield all outdoor lights with full cut-off shields**	**YES / No**	Except very low to ground and shielded by vegetation.
▪ **Angle all lights downward**	**YES / No**	Except very low to ground and shielded by vegetation.
▪ **Lower intensity (lumens) of outdoor lights**	**YES / No**	
▪ **Change bulb color to non-white spectrum**	**YES / No**	
▪ **Prohibit/control unleashed predatory animals; prohibit outdoor feeding of animals; require sealed rubbish containers**	**YES / No**	
▪ **Provide Worker Seabird Awareness Training to staff**	**YES / No**	See Item 6, above, and Appendix C (Standard Operating Procedure).
▪ **Provide outreach materials to staff & guests**	**YES / No**	See item 6, above, and Appendix D (guest brochure).
▪ **Host Save Our Shearwaters (SOS) Aid Station**	**YES / No**	

Item 8. <u>Minimization Plans</u>. 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 follows 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

List of Buildings	Minimization Measures	Cost to Implement	Responsible Staff	Timeline
Parking lot lights (66)	Lights are full cut-off fixtures; lights are down directed; poles are minimum height (25 feet)	N/A	Engineering	Completed
Signage lights (36)	Lights are downward angled; lights are low to ground (1-2 ft.); lights are low wattage	N/A	Engineering	Completed
Wall-pack lights (36)	Lights are angled down; lights are shielded (either by eaves overhang or retrofit shields)	N/A	Engineering	Completed
Landscaping & grounds lighting (321)	Most grounds and accents lights directed downward; others shielded by vegetation; grounds lights low to ground.	N/A	Engineering	Completed
Individual guest room interior lights	Avoidance Measures 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. 2. Encourage guests to cover room windows at night during fallout season Minimization Measures. 1. All guest room windows were tinted to reduce amount of light visible from the exterior.	N/A	Security	Completed

Table 6: Seabird Mortality Minimization Plan

Minimization Measures	Describe minimization method (e.g. trapping, outreach, enact policy)	Cost to Implement	Responsible Staff
Remove & control loose predatory animals at the facility. (Loose animals can kill grounded seabirds and this measure aims to prevent seabird mortality by animals.)	The resort implements this measure, except as noted in Table 4, above. The resort deploys cat traps as needed.	N/A	Grounds department
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.)	The resort implements this measure, except as noted in Table 4, above. Staff is trained that this is not allowed, and security monitors compliance	N/A	Management staff.
Conduct searches to recover downed birds at the property & turn them into SOS following protocols (see monitoring plan below).	See Item 9 below.	N/A	Engineering, grounds and security staff.
Train staff to follow minimization measures.	See Item 9 below, and Appendix C.	N/A	Management staff.

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 7: Covered Seabird Take Monitoring Protocols

Please provide the following information for the protocol items below		
Item	**Protocol** (fill in protocol & provide reasons)	**KSHCP Guideline**
Percentage of the total property that will be searched & the total area to be searched	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.	Search as much area as possible
Frequency of searches (# per day or per week)	At least once a day for all built-upon areas, more frequently for other areas.	Twice daily
Time of day of searches	Inspections are conducted throughout the day.	2-3 hours after sunset, and within 3 hours after sunrise
Number of searchers per search area	The entire staff, amounting to some 400 or more employees.	Depends on site conditions and safety considerations and vegetation, nearby hazards/threats
Proposed training	See Items 7 and 9 above, and Appendix C.	Annual training covering seabird identification, seabird handling, response procedures, verified and documented

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)		
Item	**Protocol** (fill in protocol & provide reasons)	**KSHCP Guideline**
Location & description of the beach, or beaches, surveyed and the linear distance of the beach.	Kalapaki Beach is approximately a quarter mile long and is located directly in front of the pool.	Beach area surveyed should coincide with visibility from the facility with the lights.
Frequency of searches (# per day or per week)	Groundskeepers rake the beach twice a week.	Weekly during nesting season (typ. May 15 to end of August)
Number of searchers per search area	One groundskeeper rakes the beach	Depends on site conditions and safety considerations
Proposed training	N/A. The hotel has never had nesting turtles on the beach.	Searchers should receive annual training conducted by the DLNR or the USFWS, or their designee.

Table 9: Green Sea Turtle 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)		
Item	**Protocol** (fill in protocol & provide reasons)	**KSHCP Guideline**
Frequency of checks (# per day or per week)	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.	Active nests should be monitored every 1-2 days; then daily during expected hatching date
Light avoidance	N/A	If lights cannot be deactivated or shielded from the nest, each nest should be screened from visible light.
Number of searchers per search area	N/A	Depends on site conditions and safety considerations

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

	Newell's Shearwater	Hawaiian Petrel	Band-rumped Storm-Petrel
1. Annual average number (SOS data – or – monitoring data) of downed NESH (5 most recent years), HAPE or BRSP (15 most recent years)	0.80	-	-
2. Annual observed lethal take estimate (12% of 1, all downed birds)	0.10	0	0
3. Annual unobserved lethal take estimate (e.g. 100% of 1, all downed birds if 50% searcher efficiency assumed)	1.00	0	0
4. Total estimated annual lethal take from light attraction (2+3)	1.10	0	0
Requested Annual Lethal Take	1.10	0	0
Requested Take Over Permit Term	33.00	0.033 (1 for 30 year permit) 1	0.033 (1 for 30 year permit) 1

Item 2. Select the requested take authorization and permit/license term coverage for each of the Covered Species.

Table 11: Newell's Shearwater:

Age Class	Annual Take Estimate: Fledglings	Annual Take Estimate: Adults or Sub-Adults	Take Limit for License/Permit Term
Mortality (Lethal)			
Injury (Non-lethal)			

Table 12: Hawaiian Petrel:

Age Class	Annual Take Estimate: Fledglings	Annual Take Estimate: Adults or Sub-Adults	Take Limit for License/Permit Term
Mortality (Lethal)			
Injury (Non-lethal)			

Table 13: Band-Rumped Storm-Petrel:

Age Class	Annual Take Estimate: Fledglings	Annual Take Estimate: Adults or Sub-Adults	Take Limit for License/Permit Term
Mortality (Lethal)			
Injury (Non-lethal)			

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

Dwg. No.: 2026 A
Source: Tax Maps Branch
By: D.S.C.-P.C.e. H.N. Jan 1977
PLAT 01
NAWILIWILI
BAY
PLAT 01
-INSET-
KALAPAKI
ROAD
STREET
POR. OF KALAPAKI LINUE KAUAI
SUBJECT TO CHANGE
TAX MAP
FOURTH DIVISION
3
5
02
CONTAINING PARCELS

APPENDIX B

Kalapaki Beach
Lu'au Gardens
Cabana 1 2
Cabana 3
Massage Cabanas
Elevator to Hokuala
Guest Parking
POOL
Tele-Tai
kukui's
AUPAKA TERRACE
HA'UPU TOWER
MAIN LOBBY
NOUNOU TOWER
Barbeque Grills
KAHILI TOWER
KILOHANA TOWER
WAI'ALE'ALE TOWER
KILOHANA TOWER
Ni'ihau Court
Koi Pond
Ka Mala O Kalapaki Garden
Kaua'i Court
Puna Court
KAUA'I BALLROOM
PUNA BALLROOM
Hotel Sales & Events
You Are Here
MAIN ENTRANCE
DUKE'S KAUAI
CAFE PORTOFINO
Kaua'i Ballroom
K1 Kona Room (Salon 1)
K2 Halele'a Room (Salon 2)
K3 Ko'olau Room (Salon 3)
Puna Ballroom
P1 Kalapaki Room
P2 Nawiliwili Room (A)
P3 Niumalu Room (B)
P4 Haiku Room (C)
P5 Kipu Room (D)
ResortAmenities
A Bell Desk/Valet
B Front Desk
C MVCI Lobby Welcome Desk
D Concierge Desk
E Pool Hut & Towels
F Kid's Pool
G Lu'au Gardens
H Men's/Women's Changing Rooms 3rd Floor
I Owner's Lounge 3rd Floor
J MVCI Welcome Desk/Sales Gallery
K Fitness Center
L Business Center
M Barbeque Grills
N Owner Relations
O Pele's Wedding & Events
Resort Conveniences
Elevators
Wheelchair Access
Restrooms
ATM
Washer/Dryer
Designated Smoking Area
Shops & Services
1 Enterprise Rent A Car and Jack Harter Helicopter
2 Lamont's Gift & Sundry
3 Shops Alexander Day Spa & Salon
4 Grande's Gems
5 Tropical Tantrum
6 Kauai Beach Boys
7 Tabora Gallery
8 Seductions of Kauai Gallery
9 Kauai Down Under, Kauai Z Tourz & Hawaiian Style Surfing
Additional Guest Parking, Hokuala Golf Kalanipu'u, Beach Access
Exit to Rice Street Guest Parking
MARRIOTT RESORT KAUA'I

APPENDIX C

Kaua‘i Marriott Resort Seabird Awareness and Response Training - 2019

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

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 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.

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.

APPENDIX E

KAUAI SEABIRD

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.

Kaua‘i Seabird Habitat Conservation Program (KSHCP)

Participant Inclusion Plan (PIP)

Name of Applicant/Participant
NCL (Bahamas) Ltd.

DRAFT

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:	Preparer Contact:	Lisa A. Bail, Esq. Counsel for NCL
	Address:	Address:	Goodsill Anderson Quinn & Stifel 999 Bishop Street, Suite 1600 Honolulu, HI 96813
	Email: Telephone:		lbail@goodsill.com (808) 547-5787

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**
- **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.

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.

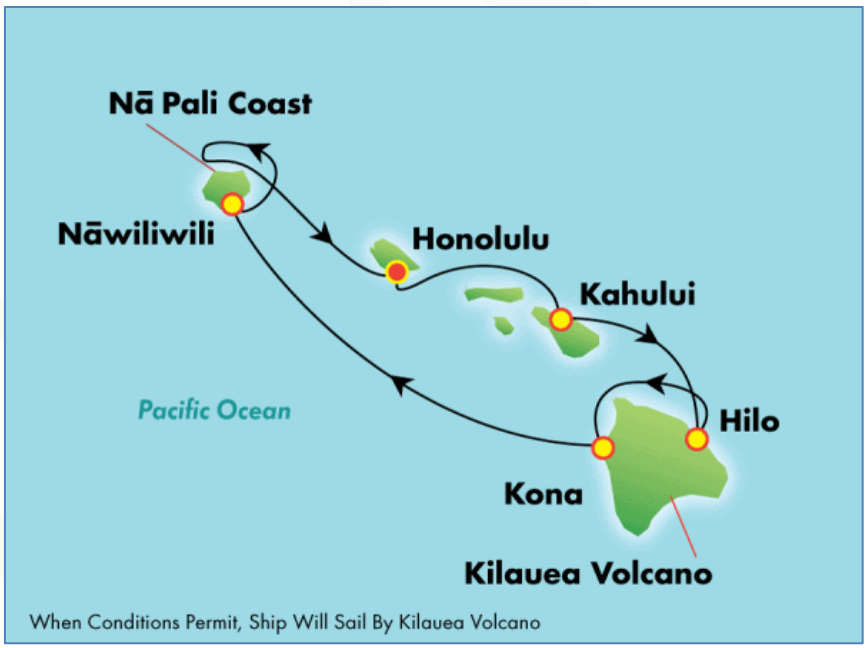

Figure 1- Typical weekly cruise track

DAY	PORT	ARRIVE	DEPART
Sat	Honolulu	-	7:00 PM
Sun Mon	Maui (Kahului)	8:00 AM -	Overnight 6:00 PM
Tue	Hilo	8:00 AM	6:00 PM
Wed	Kona	7:00 AM	5:30 PM
Thu Fri	Kauai	10:00 AM -	Overnight 2:00 PM
Sat	Honolulu	7:00 AM	-

Figure 2 – Typical cruise schedule 2018

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.

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Table 1. Exterior Ship Lighting Inventory

Exterior Ship Lighting Inventory					
Location	Description	#	# Bulbs	Wattage	Part # or description
6	Mooring Deck - Fwd.	25	2	40	4009
6	Open Deck Promenade Evacuation Deck	146	2	32	4043
7	Lifeboats Prep. Area PS + SB	52	2	32	4024
7	Crew Sun Deck	12	1	17	4020
6	Lifeboats Floodlight Overboard	15	1	500	4062
6	Lifeboats Floodlight Overboard	15	1	500	4062
11	Spotlight Showers	2	1	50	4272
12	Pool Aft. - Sun & Passenger Deck	85	1	13	4259
13	Ships Name	2	20	32	
13	Bar & Sports Area Deck Aft.	52	1	13	4259
		24	2	32	4043
		6	2	60	4267
13	Open & Viewing Deck Fwd.	54	1	13	4259
		14	1	50	4265
14	Open Deck Area Aft.	34	2	32	4043
		9	2	17	4044
		13	1	13	4259
14	Open Deck Area Fwd.	52	1	13	4259
15	Funnel Light NCLA Logo	2	20	32	
15	Helicopter Pick Up Area	8	1	500	4062
		26	1	13	4259
12-15+	Festival Light Aft. (String Lights)	1	67	25	60m. Length
15+	Festival Light Midship. (String Lights)	1	106	25	40.5m. Length
12-15+	Festival Light Fwd. (String Lights)	1	44	25	31.5m. Length

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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.		
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**
Are any of the Covered Activities (lights) visible from a beach?	**Yes / NO**	**If yes, describe the specific lights (type, , height, purpose) & specific location; provide map & photos showing distance from beach**
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**

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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…."

(USCG–2003–14749, 68 FR 39302, July 1, 2003, as amended, 68 FR 60514, Oct. 22, 2003). 33 CFR §104.285 is attached as Appendix A.

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 <u>avoid</u> 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 3: Light Attraction Alternatives to the Taking

Artificial Light Attraction Alternatives to the Taking Considered	Reasons Alternatives are not Being Utilized (provide justification)
▪ Deactivate all outdoor artificial lights from dusk to dawn during the fledgling fall-out season September 15 to December 15	U.S. Coast Guard regulations do not permit ships to be dark at night
▪ Change operations to eliminate the need for outdoor artificial lighting (e.g., from nighttime to daylight hours)	U.S. Coast Guard regulations do not permit, SOLAS does not allow, crew and passenger safety and safety does not allow
▪ 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)	Not Applicable
▪ Other alternatives to the taking considered, if any. If facility is proposed, include alternative designs considered	Not Applicable

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

Exterior Lights Not Illuminated During the Shearwater Fledging Season					
Location	Description	#	# Bulbs	Wattage	Switch
6	Mooring Decl – Fwd.	25	2	40	S2
7	Lifeboats Prep. Area PS + SB	52	2	32	S4
7	Crew Sun Deck	12	1	17	S4F
6	Lifeboats Floodlight Overboard	15	1	500	S5-PS
6	Lifeboats Floodlight Overboard	15	1	500	S6-SB
13	Ships Name	2	20	32	S10
14	Open Deck Area Aft.	34	2	32	S12
		9	2	17	
		13	1	13	
14	Open Deck Area Fwd.	52	1	13	S13
15	Funnel Light NCLA Logo	2	20	32	S14
15	Helicopter Pick Up Area	8	1	500	S15
		26	1	13	
12-15+	Festival Light Aft. (String Lights)	1	67	25	S16
15+	Festival Light Midship. (String Lights)	1	106	25	S17
12-15+	Festival Light Fwd. (String Lights)	1	44	25	S18
Exterior Lights Illuminated During the Shearwater Fledging Season					
6	Open Deck Promenade Evacuation Deck	146	2	32	S3
11	Spotlight Showers	2	1	50	S7
12	Pool Aft. - Sun & Passenger Deck	85	1	13	S8
13	Bar & Sports Area Deck Aft.	52	1	13	S9
		24	1	32	
		6	2	60	
13	Open & Viewing Deck Fwd.	54	1	13	S11
14		14	1	50	

Table 5: Seabird Light Attraction Minimization Measures Considered

Minimization Measures Considered	Feasible? (Y / N)	If not Feasible to Implement Measures, Provide Reason
▪ **Change time of light use (lights off earlier)**	**Yes /NO**	Not practicable aboard a moving vessel due to safety and security concerns
▪ **Deactivate unnecessary lights**	**YES / No**	This has been done to the extent that the US Coast Guard and SOLAS regulations allow
▪ **Replace all outdoor lights with full cut-off fixtures**	**YES / No**	This has been done to the extent that the US Coast Guard and SOLAS regulations allow
▪ **Shield all outdoor lights with full cut-off shields**	**YES / No**	This has been done to the extent that the US Coast Guard and SOLAS regulations allow
▪ **Angle all lights downward**	**YES / No**	This has been done to the extent that the US Coast Guard and SOLAS regulations allow
▪ **Lower intensity (lumens) of outdoor lights**	**YES / No**	This has been done extensively in all outdoor areas on board the vessel
▪ **Change bulb color to non-white spectrum**	**YES / No**	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
▪ **Prohibit/control unleashed predatory animals; prohibit outdoor feeding of animals; require sealed rubbish containers**	**YES / No**	Not applicable on an ocean going ship
▪ **Provide Worker Seabird Awareness Training to staff**	**YES/ No**	All crewmembers are required to complete Seabird Awareness Training prior to their assumption of duties on each tour of duty
▪ **Provide outreach materials to staff & guests**	**YES / No**	During the seabird season printed outreach material is placed in every cabin and is posted in all crewmember areas of the vessel
▪ **Host Save Our Shearwaters (SOS) Aid Station**	**Yes / NO**	Not applicable on an ocean going ship – there is a SOS Aid Station at the harbor where any downed birds are placed

Item 8. <u>Minimization Plans</u>. 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 ensue 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

List of Buildings	Minimization Measures	Cost to Implement	Responsible Staff	Timeline

Table 7: Seabird Mortality Minimization Plan

Minimization Measures	Describe minimization method (e.g. trapping, outreach, enact policy)	Cost to Implement	Responsible Staff
Remove & control loose predatory animals at the facility. (Loose animals can kill grounded seabirds and this measure aims to prevent seabird mortality by animals.)	Not applicable on a seagoing vessel	N/A	N/A
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.)	Not applicable on a seagoing vessel	N/A	N/A
Conduct nightly/morning searches to recover downed birds at the property & turn them into SOS following protocols (see monitoring plan below).	See Table 8 and Item 9 below	N/A	Environmental officer and all crewmembers
Train staff to follow minimization measures.	See item 11 below	N/A	Environmental officer

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

Please provide the following information for the protocol items below		
Item	**Protocol** (fill in protocol & provide reasons)	**KSHCP Guideline**
Percentage of the total property that will be searched & the total area to be searched	See above ("Seabird monitoring covers 100 percent of the ship that is accessible to crew members and passengers") and Appendix E.	Search as much area as possible
Frequency of searches (# per day or per week)	Continuous searches through each day (see above)	Twice daily
Time of day of searches	Crewmembers monitor their respective duty stations throughout their shift providing 24/7 coverage every day of the year	2-3 hours after sunset, and within 3 hours after sunrise
Number of searchers per search area	Crewmembers are responsible for searching their respective duty stations. There are approximately 900 crew members	Depends on site conditions and safety considerations and vegetation, nearby hazards/threats
Proposed training	A copy of the current seabird protocols is attached as Appendix E.	Annual training covering seabird identification, seabird handling, response procedures, verified and documented

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 9: 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)		
Item	**Protocol** (fill in protocol & provide reasons)	**KSHCP Guideline**
Location & description of the beach, or beaches, surveyed and the linear distance of the beach.	N/A	Beach area surveyed should coincide with visibility from the facility with the lights.
Frequency of searches (# per day or per week)	N/A	Weekly during nesting season (typ. May 15 to end of August)
Number of searchers per search area	N/A	Depends on site conditions and safety considerations
Proposed training	N/A	Searchers should receive annual training conducted by the DLNR or the USFWS, or their designee. See **item 9a**.

Table 10: Green Sea Turtle 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)		
Item	**Protocol** (fill in protocol & provide reasons)	**KSHCP Guideline**
Frequency of checks (# per day or per week)	N/A	Active nests should be monitored every 1-2 days; then daily during expected hatching date
Light avoidance	N/A	If lights cannot be deactivated or shielded from the nest, each nest should be screened from visible light.
Number of searchers per search area	N/A	Depends on site conditions and safety considerations

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.
10. Complete the Bird Take Field Report.
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".

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

	Newell's Shearwater	Hawaiian Petrel	Band-rumped Storm-Petrel
Avg. from SOS data–or—monitoring data (5 most recent yrs. = 2012-2016)	0	_	_
Avg. from SOS data–or—monitoring data (15 most recent yrs. =2002-2016)	_	0.07	0.13
Avg. lethal take estimate – SOS DATA	0	0.00	0.00
Adjustment for unobserved take (0% not searchable vs 50% typical)	0	0.00	0.00
Total annual lethal take from light attraction	0	0.00	0
Requested Annual Take	(1 every year)	0.2 (1 every five years)	0.2 (1 every five years)
Requested Take Over Permit Term	30	6	6

Item 2. Select the requested take authorization and permit/license term coverage for each of the Covered Species.

Table 12: Newell's Shearwater:

Age Class	Annual Take Estimate: Fledglings	Annual Take Estimate: Adults or sub-adults	Take Limit for License/Permit Term
Mortality (Lethal)			
Injury (Non-lethal)			

Table 13: Hawaiian Petrel:

Age Class	Annual Take Estimate: Fledglings	Annual Take Estimate: Adults or sub-adults	Take Limit for License/Permit Term
Mortality (Lethal)			
Injury (Non-lethal)			

Table 14: Band-rumped Storm Petrel:

Age Class	Annual Take Estimate: Fledglings	Annual Take Estimate: Adults or sub-adults	Take Limit for License/Permit Term
Mortality (Lethal)			
Injury (Non-lethal)			

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, Līhuʻe HI, 96766. Visit the project website: www.Kauai-seabirdhcp.info We look forward to working with you toward helping Hawaiʻi 's unique species!

Appendices

Appendix A – 33 CFR §104.285 Navigation and Navigable Waters PART 104—MARITIME SECURITY: VESSELS Subpart B—Vessel Security Requirements § 104.285 Security measures for monitoring.

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

Appendix A – 33 CFR §104.285 Navigation and Navigable Waters PART 104—MARITIME SECURITY: VESSELS Subpart B—Vessel Security Requirements § 104.285 Security measures for monitoring.

Title 33: Navigation and Navigable Waters PART 104—MARITIME SECURITY: VESSELS
Subpart B—Vessel Security Requirements

§ 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.

[USCG–2003–14749, 68 FR 39302, July 1, 2003, as amended at 68 FR 60514, Oct. 22, 2003]

e-CFR Data is current as of April 30, 2010

Appendix B – Manufacturers specification sheets for exterior lighting fixtures

Part catalogue	Lighting Fixture

SAM Electronics

symbol no.	4009	designation:	Fluor. luminaire 2x32W, WT, SM -brackets
part no.:	271.192 111. TD	stock no.:	
class:			

electrical / light specific data

power supply (V):	2AC 115V - 60 Hz	terminal plug:		part no.:	
connecting cable:	3 x 2,5	cable gland:			

lamp type

	short name:	amount	part no.:	included:	watt:	socket:	beam angle:	light colour
1:	T8	2		☑	32 W	G13		830

☐ incandescent ☐ halogen ☑ fluorescent ☐ compact fluorescent ☐ Neon ☐ LED

required ballast unit

transformer data:		part no.:		inklusiv:	☑
ballast:	electronic	radio interf. Level:	N	dimmable:	☐
lamp cos(ph):	>0,9 to 1	connected load:	72 W		

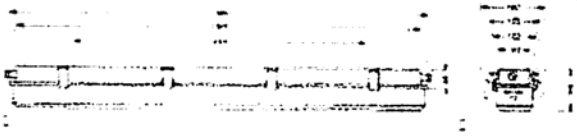
mechanical design

housing:	steel with outside brackets	finish:	white powder coated
dimensions (mm):	D: 0 H: 128 L: 1334 W: 155	weight (kg):	8,1
protection degree:	IP 66		
install. cut out (mm):	D: 0 L: 0 W: 0	mounting recess (mm):	h: 0
reflector:		dekoring:	
horizontal radiation angle:	0°		
diffuser:	opal polycarbonate	shades:	
vertical radiation angle:	0°		

remark / options: partly used: Glamox GLI 1018, SAM Store No. 999.100006, Powerlighting Rapid Start Ballast Typ 8G3905W

accessories / spare parts

1:	Electronic ballast	part no.:		included: ☑
2:	Bulb: T8 -32 G13 / 830	part no.:		included: ☐



Part catalogue	Lighting Fixture

SAM Electronics

symbol no:	4020	designation:	Fluor. cylindr. luminaire 1x17W, SM, PWT
part no:	271.192 120. TD	stock no:	
class:			

electrical / light specific data

power supply (V):	2AC 115V - 60Hz	terminal plug:		part no:	
connecting cable:	3 x 2,5	cable gland:			

lamp type

	short name:	amount	part no.:	included:	watt:	socket:	beam angle:	light colour
1:	T8	1		☑	17 W	G13		830

☐ incandescent ☐ halogen ☑ fluorescent ☐ compact fluorescent ☐ Neon ☐ LED

required ballast unit

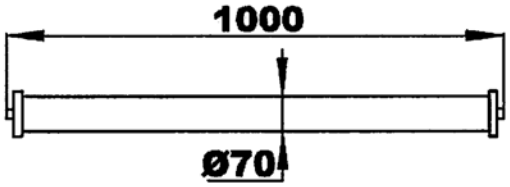
transformer data:		part no.:		inductive:	☐
ballast:	electronic	radio interf. level:	-	dimmable:	☐
lamp cos(phi):	>0,9 to 1	connected load:			

mechanical design

housing:	clear polycarbonate tube	finish:			
dimensions (mm):	D: 70 H: 0 L: 1000 W: 0	weight (kg):		protection degree:	IP 68
install. cutout (mm):	D: 0 L: 0 W: 0	mounting recess (mm):	h: 0		
reflector:		dekoring:		horizontal radiation angle:	0°
diffuser:	clear polycarbonate	shade:		vertical radiation angle:	0°
remark / options:					

accessories / spare parts

1:	Electronic ballast	part no.:		included: ☐
2:	Bulb: T8 -17W G13 / 830	part no.:		included: ☐



Part catalogue	Lighting Fixture

SAM Electronics

symbol no:	4024	designation:	Fluor. luminaire 2x32W, S/S, WT, SM - brac
part no.:	271.192 126. TD	stock no.:	
class:			

electrical / light specific data

power supply (V):	2AC 115V - 60 Hz	terminal plug:		part no.:	
connecting cable:	3 x 2,5	cable gland:			

lamp type

	short name:	amount	part no.:	included:	watt:	socket:	beam angle:	light colour
1:	T8	2		☑	32 W	G13		830

☐ incandescent ☐ halogen ☑ fluorescent ☐ compact fluorescent ☐ Neon ☐ LED

required ballast unit

transformer data:		part no.:		inklusiv:	☑
ballast:	electronic	radio interf. Level:	N	dimmable:	☐
lamp cos (phi):	>0,9 to 1	connected load:			

mechanical design:

housing:	S/S, seemless deep drawn	finish:	white powder coated

dimensions (mm):	D:	0	H:	128	L:	1340	W:	155	weight (kg):	8,1	protection degree: IP 67
install. cut-out (mm):	D:	0	L:	0	W:	0	mounting recess (mm):	h: 0			

reflector:		dekoring:		horizontal radiation angle:	0°
diffuser:	polycarbonate, clear	shade:		vertical radiation angle:	0°

remark / options: Outside junction box

accessories / spare parts

1:	Electronic ballast	part no.:		included:	☐
2:	Bulb: T8 -32W G13 / 830	part no.:		included:	☐

Part catalogue	Lighting Fixture

SAM Electronics

symbol no:	4043	designation:	Fluor. luminaire 2x32W, S/S, WT, SM - bolts
part no:	271.192 533. TD	stock no:	
class:			

electrical / light specific data

power supply (V):	2AC 115V - 60 Hz	terminal plug:		pin no:	
connecting cable:	3 x 2,5	cable gland:			

lamp type

	short name:	amount	part no.:	included:	watt:	socket:	beam angle:	light colour
1:	T8	2		☑	32 W	G13		830

☐ Incandescent ☐ halogen ☑ fluorescent ☐ compact fluorescent ☐ Neon ☐ LED

required ballast unit

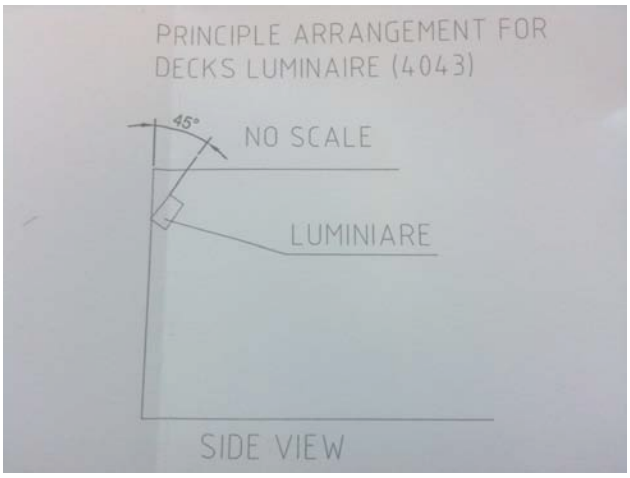
transformer data:		part no.:		inclusiv:	☑
ballast:	electronic	radio interf. Level:	N	dimmable:	☐
lamp cos(phi):	>0,9 to 1	connected load:			

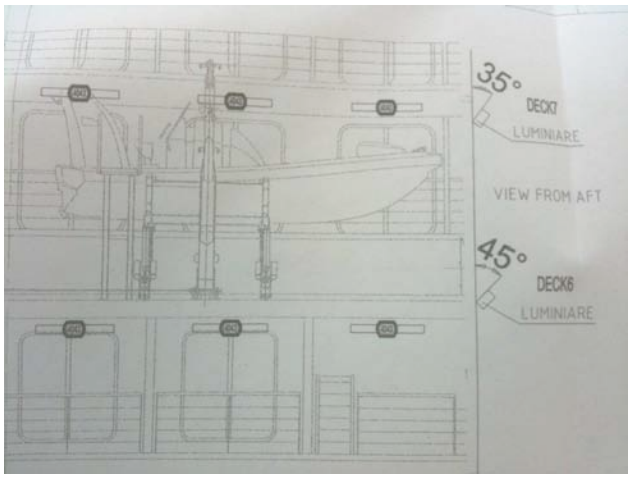
mechanical design:

housing:	S/S, seemless deep drawn	finish:	white powder coated
dimensions (mm):	D: 0 H: 109 L: 1340 W: 155	weight (kg):	8,1
protection degree:	IP 67		
Install. cut out (mm):	D: 0 L: 0 W: 0	mounting recess (mm):	h: 0
reflector:		dekoring:	
horizontal radiation angle:	0°		
diffuser:	polycarbonate, clear	shade:	
vertical radiation angle:	0°		
remark / options:	Outside junction box optional		

accessories / spare parts

1:	Electronic ballast	part no.:		included:	☐
2:	Bulb: T8 -32W G13 / 830	part no.:		included:	☐





Part catalogue	Lighting Fixture

SAM Electronics

symbol no.:	4044	designation:	Fluor. luminaire 2x17W, S/S, WT, SM -bolts
part no.:	271.192 534. TD	stock no.:	
class:			

electrical / light specific data

power supply (V):	2AC 115V - 60 Hz	terminal plug:		part no.:	
connecting cable:	3 x 2,5	cable gland:			

lamp type

	short name:	amount	part no.:	included:	watt:	socket:	beam angle:	light colour
1:	T8	2		☑	17 W	G13		830

☐ incandescent ☐ halogen ☑ fluorescent ☐ compact fluorescent ☐ Neon ☐ LED

required ballast unit

transformer data:		part no.:		inclusiv:	☑
ballast:	electronic	radio interf. Level:	N	dimmable:	☐
lamp cos(phi):	>0,9 to 1	connected load:			

mechanical design

housing:	S/S, seemless deep drawn	finish:	white powder coated

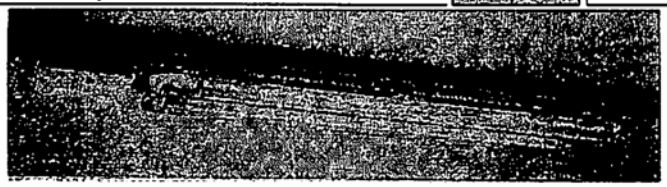
dimensions (mm):	D:	0	H:	128	L:	724	W:	155	weight (kg):	4,1	protection degree: IP 67
Install. Cut out (mm):	D:	0	L:	0	W:	0	mounting recess (mm):		h: 0		

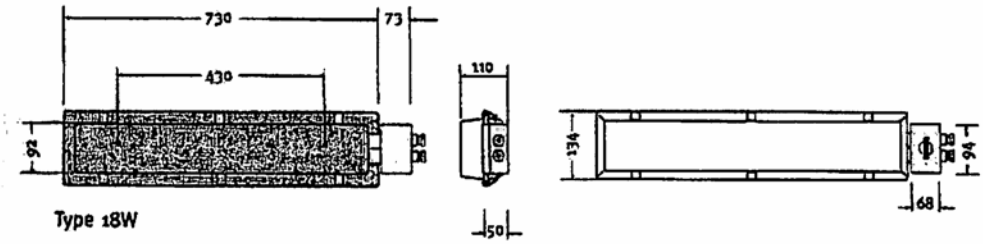
reflector:		dekoring:		horizontal radiation angle:	0°
diffuser:	polycarbonate, clear	shade:		vertical radiation angle:	0°

remark / options: Outside junction box optional

accessories / spare parts

1:	Electronic ballast	part no.:		included:	☐
2:	Bulb: T8 -17W G13 / 830	part no.:		included:	☐





Type 18W

Part catalogue	Lighting Fixture

SAM Electronics

symbol no.:	4062	designation:	Halog. floodlight 1x500 W, SM, WT
part no.:	279.641 231. TD	stock no.:	
class:			

electrical / light specific data

power supply (V):	2AC 115V - 60 Hz	terminal plug:		part no.:	
connecting cable:	3 x 2,5	cable gland:			

lamp type

	short name:	amount	part no.:	included:	watt:	socket:	beam angle:	light colour
1:	QT-DE 11/12	1		☑	500 W	R7s L:114,2		

☐ incandescent ☑ halogen ☐ fluorescent ☐ compact fluorescent ☐ Neon ☐ LED

required ballast unit

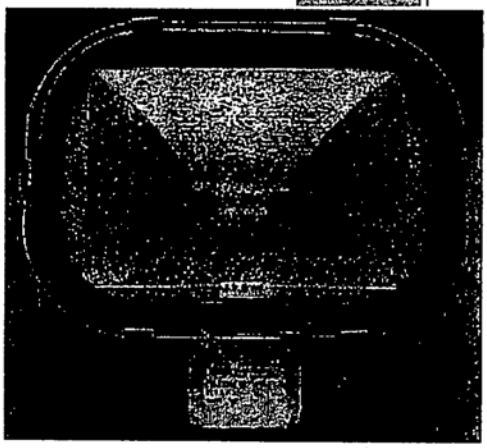
transformer data:		part no.:		inclusiv:	☑
ballast:	n/a	radio interf. level:	-	dimmable:	☐
lamp cos(phi):	>0,9 to 1	connected load:	500 W		

mechanical design

housing:	stainless steel	finish:	white powder caoted
dimensions (mm):	D: 0 H: 305 L: 0 W: 0	weight (kg):	5,5
protection degree:	IP 67		
install. cut-out (mm):	D: 0 L: 0 W: 0	mounting recess (mm):	h: 0
reflector:	wide beam anodized aluinium	dekoring:	
horizontal radiation angle:	0°		
diffuser:	safety glass	shade:	
vertical radiation angle:	0°		
remark/ options:			

accessories / spare parts

1:	Bulb: QT-DE 11/12 -500W -R7s	part no.:	included: ☑



Part catalogue	Lighting Fixture

SAM Electronics

symbol no.	4259	designation:	Fluor. wall lamp 1x13W, S/S, SM
part no.:	271.192 743. TD	stock no.:	
class:			

electrical / light specific data

power supply (V):	2AC 115V - 60 Hz	terminal plug:		part no.:	
connecting cable:	3 x 2,5	cable gland:			

lamp type

	short name:	amount	part no.:	included:	watt:	socket:	beam angle:	light colour
1:	TC-DEL	1		☑	13 W	G24q-1		830

☐ incandescent ☐ halogen ☐ fluorescent ☑ compact fluorescent ☐ Neon ☐ LED

required ballast unit

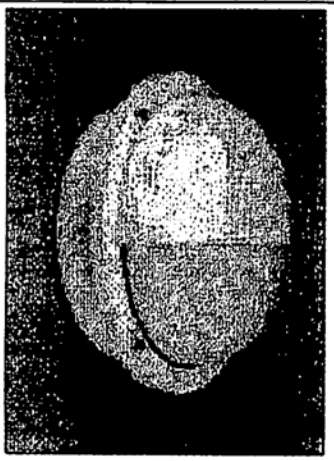
transformer data:		part no.:		mk/usb:	☐
ballast:	electronic	radiodiffert. level:	-	dimmable:	☐
lamp cos(ph):	>0,9 to 1	connected load:			

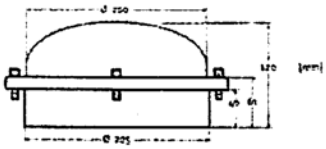
mechanical design

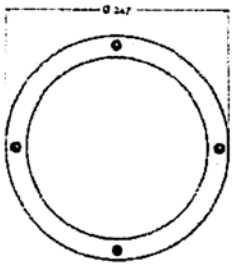
housing:	stainless steel	finish:	white powder coated		
dimensions (mm):	D: 247 H: 105 L: 0 W: 0	weight (kg):	1,8	protection degree:	IP 67
install. cutout (mm):	D: 0 L: 0 W: 0	mounting recess (mm):	h: 0		
reflector:		dekoring:	halve moon white	horizontal radiation angle:	0°
diffuser:	polycarbonate opal	shade:		vertical radiation angle:	0°
remark / options:	provided for public outdoor areas as rail light				

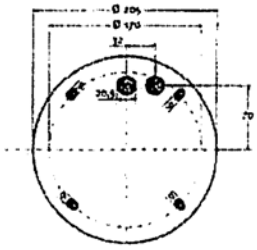
accessories / spare parts

1:	Bulb: TC-DEL -13W G24q-1	part no.:	included: ☐
2:	Deco ring: halve moon white / polyc. Opa	part no.:	included: ☐









Part catalogue	Lighting Fixture

SAM Electronics

symbol no:	4265	designation:	Halog. flood light adj.1x50W/60°, SM
part no.:	271.192 766. TD	stock no.:	
class:			

electrical / light specific data

power supply (V):	2AC 115V - 60 Hz	terminal plug:		part no.:	
connecting cable:	3 x 2,5	cable gland:			

lamp type:

	short name:	amount	part no.:	included:	watt:	socket:	beam angle:	light colour
1:	QT-ax12/c	1		☑	50 W	GY 6,35		

☐ incandescent ☑ halogen ☐ fluorescent ☐ compact fluorescent ☐ Neon ☐ LED

required ballast unit

transformer data:		part no.:		inclusive:	☑
ballast:	electronic	radio insert. level:	-	dimmable:	☑
lamp cos(phi):	>0,9 to 1	connected load:			

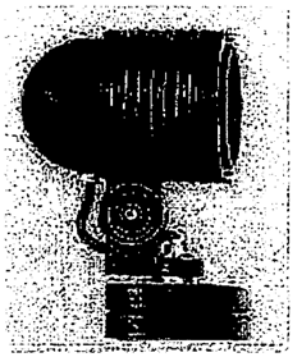
mechanical design

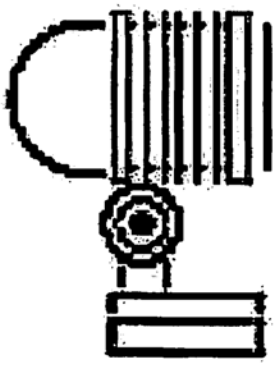
housing:	Aluminium	finish:	white powder coated		
dimensions (mm):	D: 0 H: 0 L: 0 W: 0	weight (kg):	0	protection degree:	IP 67
install. cut-out (mm):	D: 0 L: 0 W: 0	mounting recess (mm):	h: 0		
reflector:	aluminium polished	dekoring:		horizontal radiation angle:	0°
diffuser:	clear glass	shade:		vertical radiation angle:	0°

remark / options: provided for public exterior areas Deck 11 as wall washer

accessories / spare parts

1: Bulb: QTLP-ax12/ c 50W IRC | part no.: | included: ☐





Part catalogue	Lighting Fixture

SAM Electronics

symbol no.:	4267	designation:	Incand. decor. post lamp 2x40W, S/S 300m
part no.:	271.192 739. TD	stock no.:	
class:			

electrical / light specific data

power supply (V):	2AC 115V - 60 Hz	terminal plug:		part no.:	
connecting cable:	3 x 2,5	cable gland:			

lamp type

	short name:	amount	part no.:	included:	watt:	socket:	beam angle:	light colour
1:	A 60 clear	2		☑	40 W	E26		

☑ Incandescent ☐ halogen ☐ fluorescent ☐ compact fluorescent ☐ Neon ☐ LED

required ballast unit

transformer data:		part no.:		HKVSV:	☐
ballast:	n/a	radio interf. level:	-	dimmable:	☑
lamp cos(phi):	>0,9 to 1	connected load:			

mechanical design:

housing:	stainless steel	finish:	white powder coated
dimensions (mm):	D: 0 H: 0 L: 0 W: 0	weight (kg):	0
protection degree:	IP 55		
install. cut-out (mm):	D: 0 L: 0 W: 0	mounting recess (mm):	h: 0
reflector:		dekoring:	
Horizontal radiation angle:	0°		
diffuser:	polycarbonate opal	shade:	
vertical radiation angle:	0°		

remark/options: provided for public exterior area Deck 13 MFZ1, 9 pcs. 2 long arms, Globe dia. 300 mm

accessories / spare parts

1:	Bulb: A60 clear -40W E26	part no.:	included: ☐

Part catalogue	Lighting Fixture

SAM Electronics

symbol no.:	4272	designation:	Halog. flood light adj.1x50W/21°, SM
part no.:	271.192 246. TD	stock no.:	
class:			

electrical / light specific data

power supply (V):	2AC 115V - 60 Hz	terminal plug:		part no.:	
connecting cable:	3 x 2,5	cable gland:			

lamp type

	short name:	amount	part no.:	included:	watt:	socket:	beam angle:	light colour
11	QT-ax12/c	1		☑	50 W	GY 6,35		

☐ incandescent ☑ halogen ☐ fluorescent ☐ compact fluorescent ☐ Neon ☐ LED

required ballast unit

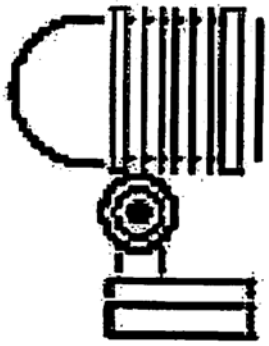
nameplate data:		part no.:		fluxlv:	☑
ballast:	electronic	radio interf. level:	-	dimmable:	☑
lamp cos(phi):	>0,9 to 1	connected load:			

mechanical design:

housing:	Aluminium	finish:	white powder coated		
dimensions (mm):	D: 0 H: 0 L: 0 W: 0	weight (kg):	0	protection degree:	IP 67
Install. cutout (mm):	D: 0 L: 0 W: 0	(mounting recess (mm):	h: 0		
reflector:	aluminium polished	dekoring:		horizontal radiation angle:	0°
diffuser:	clear glass	shade:		vertical radiation angle:	0°
remark / options:	provided for public exterior areas Deck 11 as wall washer				

accessories / spare parts

1	Bulb: QTLP-ax12/ c 50W IRC	part no.:	halogen: ☐



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Appendix C – Pride of America seabird lighting protocols showing lighting changes implemented during the seabird season

Pride of America

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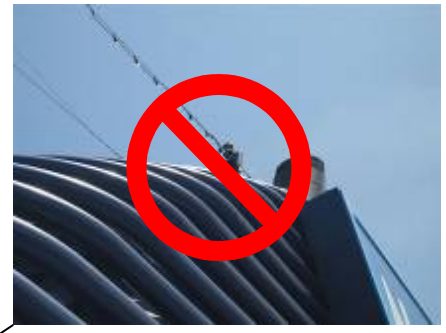
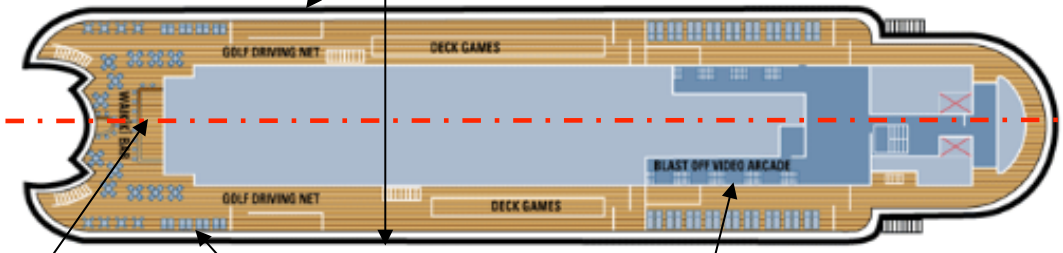
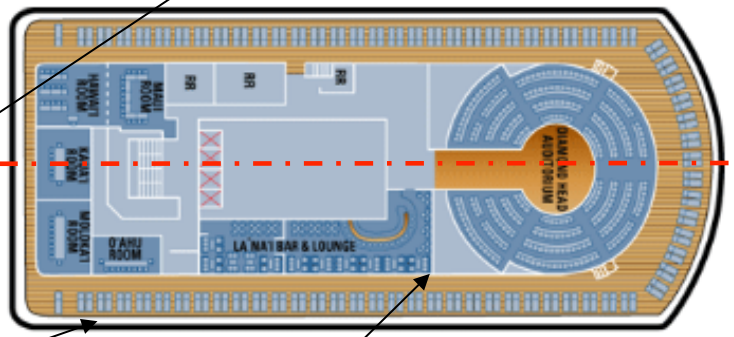
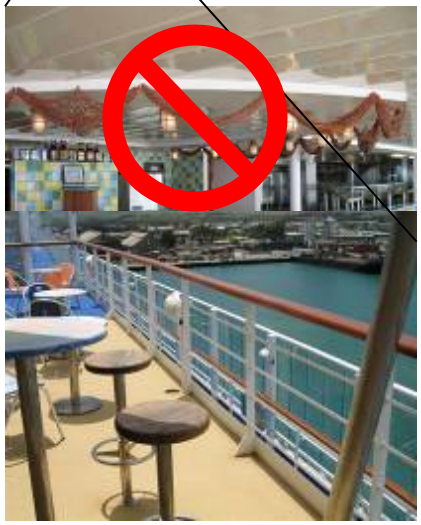
Deck 13









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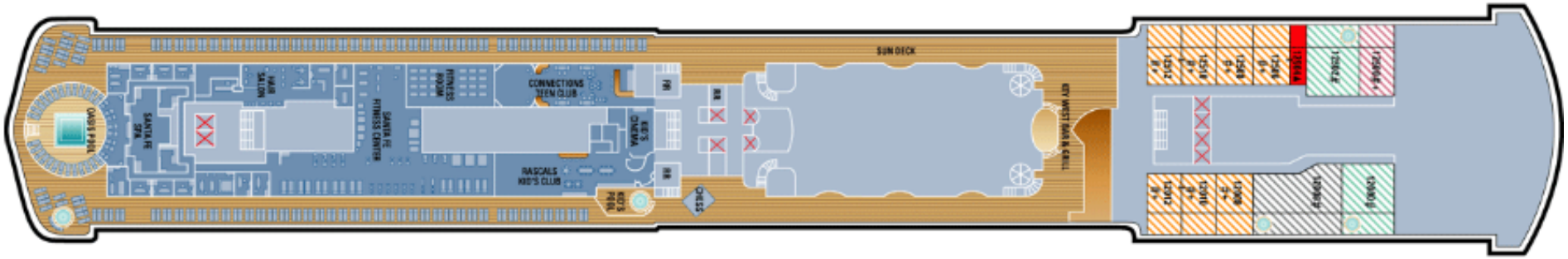
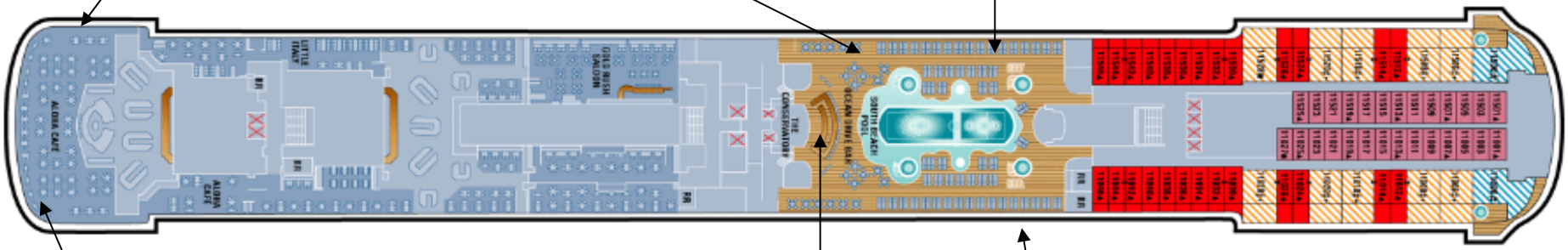
Deck 12

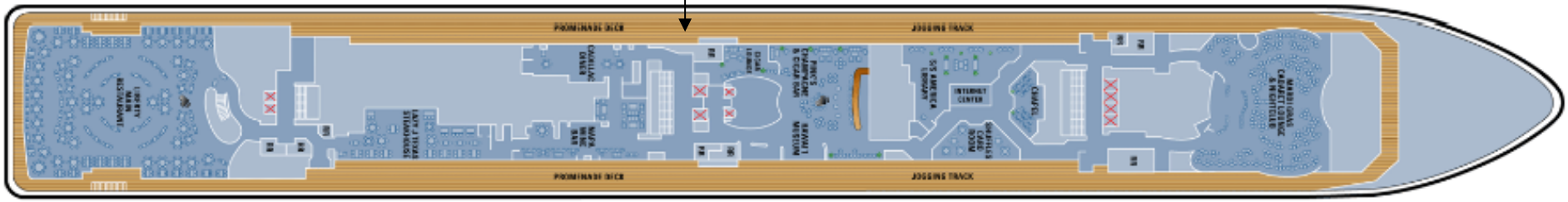

SUN DECK
OASIS POOL
SANTA FE SPA
SANTA FE FITNESS CENTER
WAR SULTAN
FITNESS ROOM
CONVECTIONS TEEN CLUB
RASCALS KID'S CLUB
KID'S PARADISE
KEY WEST BAR & GRILL
CHESS
SUITE
SUITE
SUITE

Deck 11



NORWEGIAN CRUISE LINE
FREESTYLE CRUISING

Deck 6



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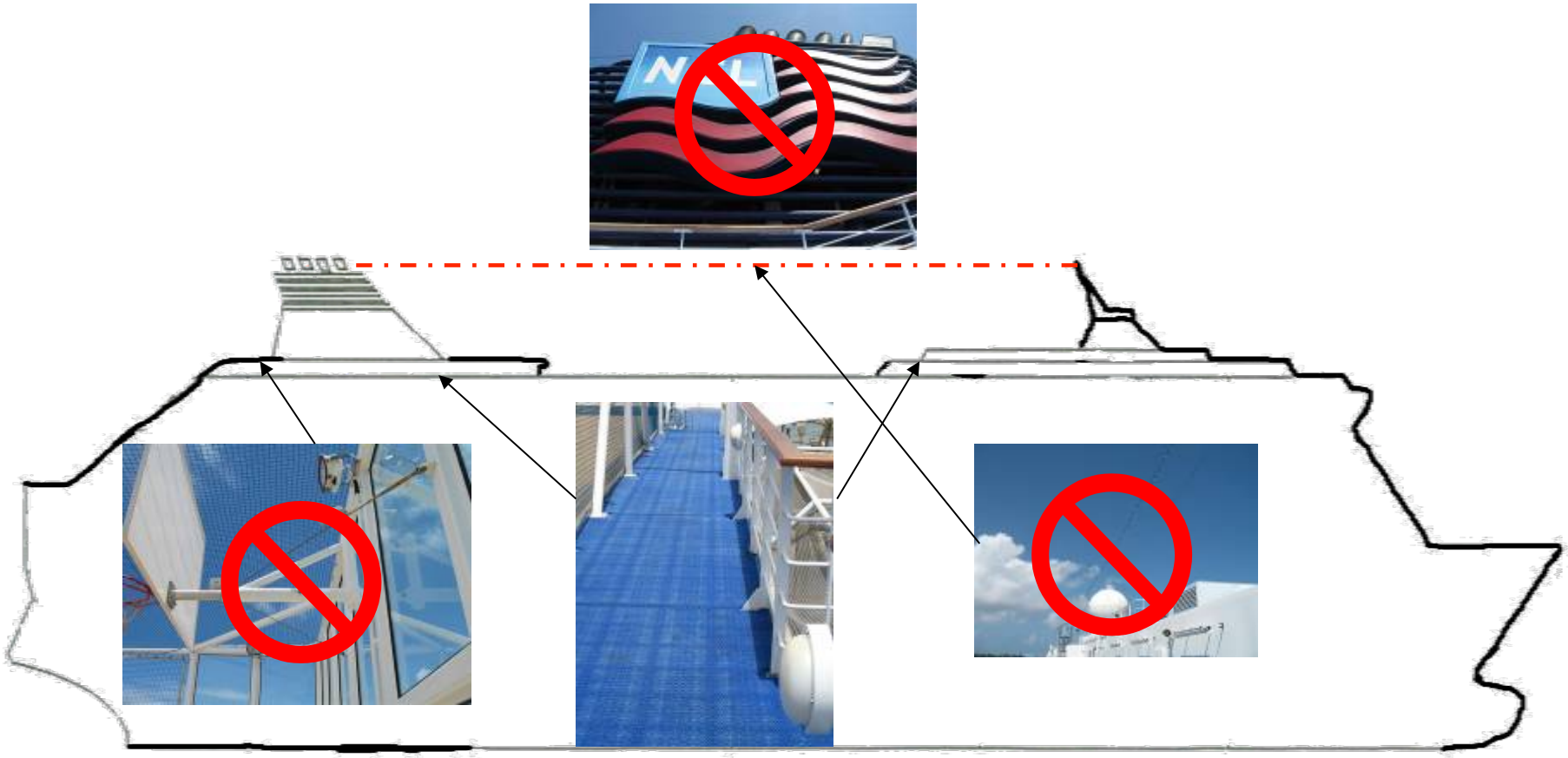

Basket Ball court Deck 14,

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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."

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Freestyle Daily

NCL America
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Pride of Aloha

Saturday September 1, 2007
Kahului, Maui

Today's forecast
20% Showers, 85F

Sunrise
6:08pm

Sunset
6:48pm

Arrival
(in port)

Departure
9:30pm

Tip of the day

When was the last time you were pampered head-to-toe? Come to the spa and indulge in a little "me" time with a relaxing massage that'll melt your cares away. You deserve to feel this good.

Tonight's entertainment

Tonight in the Stardust: Stardust Variety Show

You've laughed at the hilarious comedy of our comedian and you've been impressed by the wonder of our magician now do it all over again when you watch the Stardust Variety Show. Don't miss a minute! **Audio and video recording are prohibited. Please no children in the 1st three rows.**
Time: 7:15pm & 9:00pm, Stardust Theatre, Decks 6 & 7, Aft

Tonight in the Blue Hawai'i: Country Night

Kick up your heels for a boot-scootin' good time. We'll teach you the moves you need. Line dancing instruction begins at 9:30pm, and couples dancing will continue after the activities.
Time: 10:00pm, Blue Hawai'i Bar & Nightclub, Deck 6, Mid

What's on tap today

Australian Airbrushed Tattoos Thinking of getting a Tattoo or just want to freak your parents out? Then join us for Airbrushed Tattoos, they look real and last 3-7 Days! We are sure to have a design that will suit you
Time: 1:00pm-5:00pm, Poolside, Deck 11, Fwd

Poolside Activities Join your Cruise Director's Staff for fun activities such as Poolside Olympics, Water Aerobics and our Mr. Sexy Legs competition. Time: Activities Start at 2:30pm, Pool Deck, Deck 11, Mid

TV Theme Song Trivia Test you knowledge of the greatest TV tunes in history! Do you remember the theme to "The A Team" or how about "I Dream of Jeannie?" Well come and prove how much of a couch potato we know you are!
Time: 3:00pm, Pool deck, Deck 11, Fwd

Mr. Sexy Legs Competition Men think you have the best legs on the ship? Come up to the pool deck and put your best foot forward. Ladies we will need judges.
Time: 4:00pm, Pool Side, Deck 11, Fwd

Comment Cards Don't forget to turn your Comment Cards in. Raffle prizes will be given out at 7:00pm tonight. Marking "good" means that we're only doing an average job.
Time: 7:00pm, Reception Desk, Deck 5, Fwd

Krazy Karaoke Do you have a favorite song that you just can't stop singing? Do you find that the best songs are sung at the top of your lungs in front of a crowd? Even if you don't want to sing you can have fun watching others!
Time: 8:00pm-9:15pm
Blue Hawai'i, Deck 6, Mid

HONOLULU, HAWAI'I

You will certainly wish to enjoy all that the island of O'ahu has to offer. It is known for attractions such as Sunset Beach and the North Shore, as well as Waikiki, Pearl Harbor and the capital city of Honolulu.

O'ahu cradles a rich blend of cultures including Japanese, Chinese, Vietnamese, Samoan, Tongan, Tahitian, Hawaiian and those from other Pacific Islands. It is a melting pot due mostly to the great influx to the island of workers during the colonial plantation era.

Shoppers will find paradise in downtown Waikiki where designer labels abound in specialty shops bearing the names of Gucci, Prada, Tiffany's, Coach and many more. The Aloha Tower Marketplace, adjacent to P 10, is another wonderful to enjoy an afternoon.

Moored next to the H Maritime Center is th Falls of Clyde, an o once operated by Navigation Comp synonymous w passenger tra Hawaiian Islands for de

Don't miss this!

Specialty Restaurants Join us in one of the three onboard specialty restaurants for our for a dining option with an International flair — 50% off the cover charge after 9:00pm.
Kahlil Italian Restaurant – Deck 5, Mid. **Royal Palm Bistro** – Deck 12, Aft.
Pacific Heights – Deck 11, Aft.

Bar Services

Coffee Bar Deck 7, Aft	6:00am-11:00am
Hukilau Lanai Deck 11, Aft	5:30pm-Close
Atrium Bar Deck 7, Fwd	7:00am-Close
Breakers Bar Deck 11, Mid	7:00am-Close
Longboard Sports Bar Deck 11, Aft	9:00am-Close
Hoku Bar Deck 12, Fwd	12:00pm-Close
Plantation Club Deck 12, Aft	12:00pm-9:00pm
Captain Cook's Bar Deck 6, Mid	5:30pm-Close
Blue Hawai'i Bar & Nightclub Deck 6, Mid	5:30pm-Close
Outrigger Lounge Deck 11, Fwd	7:30pm-Close
Stardust Theatre Decks 6 & 7, Aft	Closed
	7:30pm & 8:30pm

Guest Services

Reception Desk Deck 5, Fwd (#20)	24 Hours
Internet Café Deck 7, Aft	24 Hours
Fitness & Aerobics Center Deck 11, Fwd	24 Hours
Shore Excursion Desk Deck 5, Fwd	7:00am-9:00am
Golf Hawai'i Pro Shop Deck 7, Mid	6:00pm-8:00pm
Galleria Gift Shop Deck 7, Aft	7:00am-12:00pm
Onboard Credit Desk Deck 5, Fwd	2:00pm-9:00pm
Mandara Spa & Salon Deck 11, Fwd	7:00am-10:30pm
Medical Center Deck 5, Fwd	8:00am-11:00am
Kids Korner Deck 7, Fwd	4:00pm-5:00pm
Photo Gallery Deck 5, Aft	3:00am-8:00pm
International Hostess Desk Deck 5, Mid (By Captain Cook's Bar)	8:30am-10:30am
	4:00pm-5:00pm
	9:00am-12:00pm
	7:00pm-10:00pm
	4:00pm-11:00pm
	6:00pm-8:00pm

All about alcohol: If you bought liquor on shore, we'll hold them, as long as they are **sealed**, for you until the last day of your cruise. If bottles are unsealed when brought aboard, the Bar Staff is bound by regulations to hold it and will be poured out. Due to Hawaii Nightclub, Deck 6, Mid
Who can drink: Alcohol consumption is prohibited for guests under the age of 21
Open Flames: Open flames (like burning candles and incense) are not allowed
Jacuzzis & Pools: Glass & bottles cannot be brought into any of the pools or hot tubs, neither can children in diapers or pull-ups, including "swimmers" can children in diapers or pull-
Sharps Containers: If you have any type of needles to throw away, please ask for a special container from the Reception Desk or the Medical Center.
Environmental Hotline
Call 877-501-0676 or E-mail Environmentalhotline@ncl.com
All reports are confidential.
The environmental hotline shall be used only to report actual or potential environmental incidents, leaks and concerns

Freestyle Dining

Room Service Decks 4-10: Dial #28	24 hours
Hukilau Lanai, Deck 11, Aft Continental Breakfast	5:30am-6:00am & 10:30am-11:30am
Hukilau Lanai, Deck 11, Aft Breakfast Buffet	6:00am-10:30am
Hukilau Café, Deck 11, Aft Breakfast Buffet	6:30am-12:00am
Crossings Main Dining Room, Deck 5, Aft Menu Selections	7:00am-9:00am
Hukilau Café, Deck 11, Aft Lunch Buffet	11:30am-2:30pm
Hukilau Lanai, Deck 11, Aft Lunch Buffet	1:00pm-5:30pm
Crossings Main Dining Room, Deck 5, Aft Menu Selections	5:30pm-10:00pm
Palace Main Dining Room, Deck 5, Fwd Menu Selections	5:30pm-9:30pm
Hukilau Café, Deck 11, Aft Dinner Buffet	5:30pm-9:00pm
Royal Palm Bistro*, Deck 12, Aft French Cuisine	5:30pm-Close
Kahlil Restaurant*, Deck 5, Mid Italian Cuisine	5:30pm-Close
Pacific Heights*, Deck 11, Aft Asian Fusion	5:30pm-Close
Longboard Sports Bar, Deck 11, Aft Imported Draft	6:00pm-3:00am

*This little star means that these restaurants charge a cover, and for what you get, you'll find it's well worth it. For reservations, call 31214 or stop by on Deck 7, Aft.
To maintain the proper ambiance for all guests—the following guidelines have been established—With the exception of the Hukilau Buffet and any other outdoor dining venue: shorts, T-shirts, tank tops, flip flops, bare feet, work-out attire, track suits, and swim wear are viewed as inappropriate after 5:00pm.
Presentable jeans are allowed in all indoor dining venues except The Palace Restaurant for all meals periods. Bermuda shorts are appropriate in all outlets after 5:00pm if accompanied by a jacket and knee socks.
Children under 12 years are allowed to wear presentable shorts and jeans in all dining venues for all meals.
Restaurant Cancellations: To ensure each of our guests receive our best service, we can only hold your dinner reservation for 15 minutes. If you need to cancel, please do so by 5 pm on the day of your reservation to avoid having the cover charge for up to two guests applied to your account.

Customer Relations: Got a service problem? We'll do our best to solve it. Call 33.
Walking & Jogging: The Promenade Deck, Deck 6 is a walking/jogging track. The deck is open 24 hours, as a courtesy to your fellow Guests we kindly ask that you do not jog between 9:00pm and 6:00am. Remember, all sports play is at your own risk.
Safety Equipment: Please do not remove or meddle with any safety equipment onboard (such as smoke detectors, sprinkler heads or fire extinguishers). And please follow safety instructions from the crewmembers.
Vacuum Toilets: Our system is in place to best conserve water and protect our environment. Please do not flush cloth, metal, sanitary napkins or plastic, as this will cause blockage to not only your own toilet but up to 50 other toilets on the same vacuum line.
Smoking Policy: Smoking is permitted in the following areas only: designated areas outside on deck 12, staterooms and staterooms balconies. Please refrain from pipes & cigars in staterooms & balconies.

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Appendix D – Crew Seabird Awareness Training Program

Seabird Awareness Training Program

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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**

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Other Seabirds

White-tailed Tropicbird

Sooty Tern

Wedge-tailed Shearwater

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 35-37inches.

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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

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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.

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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

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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 (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

NCL NORWEGIAN CRUISE LINE®

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.

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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

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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.

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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

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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

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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

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Thank You!

Be Safe and Environmentally Friendly!

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Appendix E – Seabird Protocols

Protected Seabirds (Hawaii Specific)

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

Protected Seabirds (Hawaii Specific)

Date	Reference/Photo Name	Time	Location or Cabin #
091608	091608A	2130hrs	Deck 6 Port Side Fwd Adjacent to Raft Launching station #2
091608	091608B	2145hrs	Deck 11 Aft Lido Portside adjacent to wait station

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

B500.01

NCL SEMS

Safety & Environmental Management System

SEABIRD DATA LOG

Issue date:
October 31st 2008

Date	Reference	Time	Location or Cabin #	Species	Ship Location Latitude	Ship Location Longitude	Agency or SOS contacted.	Time Contact Made / pickup	Pier-side SOS Aid Station.	Remarks

Appendix G– Seabird photography guidelines

Protected Seabirds (Hawaii Specific)

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, 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

Date	Reference	Time	Location or Cabin #
01Feb11	010211	0700	Deck 6 Port side outside Cadillac Diner
02Feb11	010212	0630	Deck 11 Aft Lido portside adjacent wait station

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."

NCL
NORWEGIAN CRUISE LINE
FREESTYLE CRUISING

Freestyle Daily

NCL America
FREESTYLE CRUISING

Pride of Aloha

Saturday September 1, 2007
Kahului, Maui

Today's forecast
20% Showers, 85F

Sunrise
6:08pm

Sunset
6:48pm

Arrival
(in port)

Departure
9:30pm

Tip of the day

When was the last time you were pampered head-to-toe? Come to the spa and indulge in a little "me" time with a relaxing massage that'll melt your cares away. You deserve to feel this good.

Tonight's entertainment

Tonight in the Stardust: Stardust Variety Show

You've laughed at the hilarious comedy of our comedian and you've been impressed by the wonder of our magician now do it all over again when you watch the Stardust Variety Show. Don't miss a minute! **Audio and video recording are prohibited. Please no children in the 1st three rows.**
Time: 7:15pm & 9:00pm, Stardust Theatre, Decks 6 & 7, Aft

Tonight in the Blue Hawai'i: Country Night

Kick up your heels for a boot-scootin' good time. We'll teach you the moves you need. Line dancing instruction begins at 9:30pm, and couples dancing will continue after the activities.
Time: 10:00pm, Blue Hawai'i Bar & Nightclub, Deck 6, Mid

What's on tap today

Australian Airbrushed Tattoos Thinking of getting a Tattoo or just want to freak your parents out? Then join us for Airbrushed Tattoos, they look real and last 3-7 Days! We are sure to have a design that will suit you
Time: 1:00pm-5:00pm, Poolside, Deck 11, Fwd

Poolside Activities Join your Cruise Director's Staff for fun activities such as Poolside Olympics, Water Aerobics and our Mr. Sexy Legs competition. Time: Activities Start at 2:30pm, Pool Deck, Deck 11, Mid

TV Theme Song Trivia Test you knowledge of the greatest TV tunes in history! Do you remember the theme to "The A Team" or how about "I Dream of Jeannie?" Well come and prove how much of a couch potato we know you are!
Time: 3:00pm, Pool deck, Deck 11, Fwd

Mr. Sexy Legs Competition Men think you have the best legs on the ship? Come up to the pool deck and put your best foot forward. Ladies we will need judges.
Time: 4:00pm, Pool Side, Deck 11, Fwd

Comment Cards Don't forget to turn your Comment Cards in. Raffle prizes will be given out at 7:00pm tonight. Marking "good" means that we're only doing an average job.
Time: 7:00pm, Reception Desk, Deck 5, Fwd

Krazy Karaoke Do you have a favorite song that you just can't stop singing? Do you find that the best songs are sung at the top of your lungs in front of a crowd? Even if you don't want to sing you can have fun watching others!
Time: 8:00pm-9:15pm
Blue Hawai'i, Deck 6, Mid

HONOLULU, HAWAI'I

You will certainly wish to enjoy all that the island of O'ahu has to offer. It is known for attractions such as Sunset Beach and the North Shore, as well as Waikiki, Pearl Harbor and the capital city of Honolulu.

O'ahu cradles a rich blend of cultures including Japanese, Chinese, Vietnamese, Samoan, Tongan, Tahitian, Hawaiian and those from other Pacific Islands. It is a melting pot due mostly to the great influx to the island of workers during the colonial plantation era.

Shoppers will find paradise in downtown Waikiki where designer labels abound in specialty shops bearing the names of Gucci, Prada, Tiffany's, Coach and many more. The Aloha Tower Marketplace, adjacent to P 10, is another wonderful to enjoy an afternoon.

Moored next to the H Maritime Center is th Falls of Clyde, an o once operated by Navigation Comp synonymous w passenger tra Hawaiian Islands for de

Don't miss this!

Specialty Restaurants Join us in one of the three onboard specialty restaurants for our for a dining option with an International flair — 50% off the cover charge after 9:00pm.
Kahlil Italian Restaurant – Deck 5, Mid. **Royal Palm Bistro** – Deck 12, Aft.
Pacific Heights – Deck 11, Aft.

Bar Services

Coffee Bar Deck 7, Aft	6:00am-11:00am
Hukilau Lanai Deck 11, Aft	5:30pm-Close
Atrium Bar Deck 7, Fwd	7:00am-Close
Breakers Bar Deck 11, Mid	7:00am-Close
Longboard Sports Bar Deck 11, Aft	9:00am-Close
Hoku Bar Deck 12, Fwd	12:00pm-Close
Plantation Club Deck 12, Aft	12:00pm-9:00pm
Captain Cook's Bar Deck 6, Mid	5:30pm-Close
Blue Hawai'i Bar & Nightclub Deck 6, Mid	5:30pm-Close
Outrigger Lounge Deck 11, Fwd	7:30pm-Close
Stardust Theatre Decks 6 & 7, Aft	Closed
	7:30pm & 8:30pm

Guest Services

Reception Desk Deck 5, Fwd (#20)	24 Hours
Internet Café Deck 7, Aft	24 Hours
Fitness & Aerobics Center Deck 11, Fwd	24 Hours
Shore Excursion Desk Deck 5, Fwd	7:00am-9:00am
Golf Hawai'i Pro Shop Deck 7, Mid	6:00pm-8:00pm
Galleria Gift Shop Deck 7, Aft	7:00am-12:00pm
Onboard Credit Desk Deck 5, Fwd	2:00pm-9:00pm
Mandara Spa & Salon Deck 11, Fwd	7:00am-10:30pm
Medical Center Deck 5, Fwd	8:00am-11:00am
Kids Korner Deck 7, Fwd	4:00pm-5:00pm
Photo Gallery Deck 5, Aft	3:00am-8:00pm
International Hostess Desk Deck 5, Mid (By Captain Cook's Bar)	8:30am-10:30am
	4:00pm-5:00pm
	9:00am-12:00pm
	7:00pm-10:00pm
	4:00pm-11:00pm
	6:00pm-8:00pm

All about alcohol: If you bought liquor on shore, we'll hold them, as long as they are **sealed**, for you until the last day of your cruise. If bottles are unsealed when brought aboard, the Bar Staff is bound by regulations to hold it and will be poured out. Due to Hawaii Nightclub, Deck 6, Mid
Who can drink: Alcohol consumption is prohibited for guests under the age of 21
Open Flames: Open flames (like burning candles and incense) are not allowed
Jacuzzis & Pools: Glass & bottles cannot be brought into any of the pools or hot tubs, neither can children in diapers or pull-ups, including "swimmers" can children in diapers or pull-
Sharps Containers: If you have any type of needles to throw away, please ask for a special container from the Reception Desk or the Medical Center.
Environmental Hotline
Call 877-501-0676 or E-mail Environmentalhotline@ncl.com
All reports are confidential.
The environmental hotline shall be used only to report actual or potential environmental incidents, leaks and concerns

Freestyle Dining

Room Service Decks 4-10: Dial #28	24 hours
Hukilau Lanai, Deck 11, Aft Continental Breakfast	5:30am-6:00am & 10:30am-11:30am
Hukilau Lanai, Deck 11, Aft Breakfast Buffet	6:00am-10:30am
Hukilau Café, Deck 11, Aft Breakfast Buffet	6:30am-12:00am
Crossings Main Dining Room, Deck 5, Aft Menu Selections	7:00am-9:00am
Hukilau Café, Deck 11, Aft Lunch Buffet	11:30am-2:30pm
Hukilau Lanai, Deck 11, Aft Lunch Buffet	1:00pm-5:30pm
Crossings Main Dining Room, Deck 5, Aft Menu Selections	5:30pm-10:00pm
Palace Main Dining Room, Deck 5, Fwd Menu Selections	5:30pm-9:30pm
Hukilau Café, Deck 11, Aft Dinner Buffet	5:30pm-9:00pm
Royal Palm Bistro*, Deck 12, Aft French Cuisine	5:30pm-Close
Kahlil Restaurant*, Deck 5, Mid Italian Cuisine	5:30pm-Close
Pacific Heights*, Deck 11, Aft Asian Fusion	5:30pm-Close
Longboard Sports Bar, Deck 11, Aft Imported Draft	6:00pm-3:00am

*This little star means that these restaurants charge a cover, and for what you get, you'll find it's well worth it. For reservations, call 31214 or stop by on Deck 7, Aft.
To maintain the proper ambiance for all guests—the following guidelines have been established—With the exception of the Hukilau Buffet and any other outdoor dining venue: shorts, T-shirts, tank tops, flip flops, bare feet, work-out attire, track suits, and swim wear are viewed as inappropriate after 5:00pm.
Presentable jeans are allowed in all indoor dining venues except The Palace Restaurant for all meals periods. Bermuda shorts are appropriate in all outlets after 5:00pm if accompanied by a jacket and knee socks.
Children under 12 years are allowed to wear presentable shorts and jeans in all dining venues for all meals.
Restaurant Cancellations: To ensure each of our guests receive our best service, we can only hold your dinner reservation for 15 minutes. If you need to cancel, please do so by 5 pm on the day of your reservation to avoid having the cover charge for up to two guests applied to your account.

Customer Relations: Got a service problem? We'll do our best to solve it. Call 33.
Walking & Jogging: The Promenade Deck, Deck 6 is a walking/jogging track. The deck is open 24 hours, as a courtesy to your fellow Guests we kindly ask that you do not jog between 9:00pm and 6:00am. Remember, all sports play is at your own risk.
Safety Equipment: Please do not remove or meddle with any safety equipment onboard (such as smoke detectors, sprinkler heads or fire extinguishers). And please follow safety instructions from the crewmembers.
Vacuum Toilets: Our system is in place to best conserve water and protect our environment. Please do not flush cloth, metal, sanitary napkins or plastic, as this will cause blockage to not only your own toilet but up to 50 other toilets on the same vacuum line.
Smoking Policy: Smoking is permitted in the following areas only: designated areas outside on deck 12, staterooms and staterooms balconies. Please refrain from pipes & cigars in staterooms & balconies.

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NORWEGIAN CRUISE LINE
FREESTYLE CRUISING

Kaua‘i Seabird Habitat Conservation Program (KSHCP)

Participant Inclusion Plan (PIP)

Name of Applicant/Participant:

SOF – XI Kauai PV Hotel, LP (Princeville Resort Kauai)

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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:		The Princeville Resort Kauai
Physical Address/Location of Facility:		The Princeville Resort Kauai 5520 Ka Haku Road Princeville, Hawaii 96722
Mailing Address:		Same as above
Primary Contact:	Ownership Name:	
	Address:	
	Telephone: Email:	
Alternate Contact:		
	Address:	
	Telephone: Email:	
Preparer Contact:		Lisa A. Bail, Esq. Counsel for The Princeville Resort Kauai
	Address:	Goodsill Anderson Quinn & Stifel 999 Bishop Street, Suite 1600 Honolulu, HI 96813

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

Outdoor Lighting at the Princeville Resort Kauai						
Location	**Light Type**	**Wattage**	**Bulb Color**	**Quantity**	**Purpose**	**Full cut-off/shielded**
Parking lot	Parking Pole Light/Mercury lamp	150 w	Warm White	26	Illuminate parking lot and pedestrian walkway	Full cutoff / shielded
Guard Shack - Entrance and Exit to the Resort	Shielded Flood Light/Florescent	11 w	Warm White	2	Entrance safety	Shielded
Guest walkway between Porte Cohere and Parking lot	Mushroom walkway Lights/Incandescent	20 w	Warm White	23	Illuminate pedestrian walkway	Full cutoff / shielded
Entry Drive and Walkway	Landscaping & grounds lights/Halogen	50 w	Cool white	36	Landscape illumination; accent lighting	Full cutoff / shielded
Coconut Trees around Porte Cohere water feature	Landscaping & grounds accent up lights/Halogen	20 w	Cool white	16	Landscape illumination; accent lighting	Shielded
Water Feature	Water Feature lights/Incandescent	100 w	Warm White	26	Accent lighting in water feature	No
Cooling Tower and Flower Shop	Shielded Flood Light/Florescent	11 w	Warm White	2	Staff safety	Shielded
Various locations around the Pool	Tiki Torches	N/A	Open Flame	18	Accent lighting and illumination for pedestrian walkway	N/A
Various locations around the Pool	Surface Mounted/Florescent	45 w	Cool white	2	Staff safety	No
Pool Restaurant and Pool Activity Desk	Chandelier/CFL	40 w	Cool white	22	Accent lighting and guest safety	Full cutoff / shielded
Pool Restaurant and Pool Activity Desk	Architectural Accent Lighting/Halogen	50 w	Cool white	82	Accent lighting and guest safety	Full cutoff / shielded
Pool walkway	Landscaping & grounds lighting/Halogen	50 w	Cool white	15	Landscape illumination; accent lighting and walkway illumination	Full cutoff / shielded
Pool Walkway	Incandescent	40 w	Warm White	9	Pedestrian walkway illumination	Shielded

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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.

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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.		
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** 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.
Are any of the Covered Activities (lights) visible from a beach?	**YES / No**	**If yes, describe the specific lights (type, , height, purpose) & specific location; provide map & photos showing distance from beach** See Table 1 above
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**

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 <u>avoid</u> 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.

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Table 3: Light Attraction Alternatives to the Taking

Artificial Light Attraction Alternatives to the Taking Considered	Reasons Alternatives are not Being Utilized (provide justification)
▪ **Deactivate all outdoor artificial lights from dusk to dawn during the fledgling fall-out season September 15 to December 15**	Guest and staff safety and security precludes this option.
▪ **Change operations to eliminate the need for outdoor artificial lighting (e.g., from nighttime to daylight hours)**	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.
▪ **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)**	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.
▪ **Other alternatives to the taking considered, if any. If facility is proposed, include alternative designs considered**	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.

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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.

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Table 4: Seabird Light Attraction Minimization Measures Considered

Minimization Measures Considered	Feasible? (Y / N)	If not Feasible to Implement Measures, Provide Reason
▪ **Change time of light use (lights off earlier)**	**YES/ No**	
▪ **Deactivate unnecessary lights**	**YES / No**	
▪ **Replace all outdoor lights with full cut-off fixtures**	**YES / No**	
▪ **Shield all outdoor lights with full cut-off shields**	**YES / No**	
▪ **Angle all lights downward**	**YES / No**	
▪ **Lower intensity (lumens) of outdoor lights**	**YES / No**	
▪ **Change bulb color to non-white spectrum**	**YES / No**	
▪ **Prohibit/control unleashed predatory animals; prohibit outdoor feeding of animals; require sealed rubbish containers**	**YES / No**	
▪ **Provide Worker Seabird Awareness Training to staff**	**YES / No**	See previous section and Appendix C
▪ **Provide outreach materials to staff & guests**	**YES / No**	See previous section and Appendices F, G H, I, and J.
▪ **Host Save Our Shearwaters (SOS) Aid Station**	**YES / No**	

Item 8. <u>Minimization Plans</u>. 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 ensue 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

List of Buildings	Minimization Measures	Cost to Implement	Responsible Staff	Timeline

See narrative above.

Table 6: Seabird Mortality Minimization Plan

Minimization Measures	Describe minimization method (e.g. trapping, outreach, enact policy)	Cost to Implement	Responsible Staff
Remove & control loose predatory animals at the facility. (Loose animals can kill grounded seabirds and this measure aims to prevent seabird mortality by animals.)	The resort employs commercial pest control services, additionally they deploy cat traps as soon as a cat is spotted on property (very rarely)	N/A	
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.)	Staff is trained that this is not allowed, and security monitors compliance	N/A	
Conduct nightly/morning searches to recover downed birds at the property & turn them into SOS following protocols (see monitoring plan below).	See Item 9 below.	N/A	
Train staff to follow minimization measures.	See Item 9 below, and Appendix C.	N/A	

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

Please provide the following information for the protocol items below		
Item	**Protocol** (fill in protocol & provide reasons)	**KSHCP Guideline**
Percentage of the total property that will be searched & the total area to be searched	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.	Search as much area as possible
Frequency of searches (# per day or per week)	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	Twice daily
Time of day of searches	See above	2-3 hours after sunset, and within 3 hours after sunrise
Number of searchers per search area	The entire staff, amounting to some 400 employees	Depends on site conditions and safety considerations and vegetation, nearby hazards/threats
Proposed training	See Item 7 above, Item 9 below, and Appendix C.	Annual training covering seabird identification, seabird handling, response procedures, verified and documented

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)		
Item	**Protocol** (fill in protocol & provide reasons)	**KSHCP Guideline**
Location & description of the beach, or beaches, surveyed and the linear distance of the beach.	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.	Beach area surveyed should coincide with visibility from the facility with the lights.
Frequency of searches (# per day or per week)	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	Weekly during nesting season (typ. May 15 to end of August)
Number of searchers per search area	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	Depends on site conditions and safety considerations
Proposed training	N/A	Searchers should receive annual training conducted by the DLNR or the USFWS, or their designee. See **item 9a**.

Table 9: Green Sea Turtle 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)		
Item	**Protocol** (fill in protocol & provide reasons)	**KSHCP Guideline**
Frequency of checks (# per day or per week)	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.	Active nests should be monitored every 1-2 days; then daily during expected hatching date
Light avoidance	N/A	If lights cannot be deactivated or shielded from the nest, each nest should be screened from visible light.
Number of searchers per search area	N/A	Depends on site conditions and safety considerations

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.
10. Complete the Bird Take Field Report.
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 in attached as Appendix H. Printed cards are placed in the Prince Junior Suites requesting that guests turn of 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

	Newell's Shearwater	Hawaiian Petrel	Band-rumped Storm-Petrel
Avg. from SOS data–or—monitoring data (5 most recent yrs. = 2012-2016)	**18**	**_**	**_**
Avg. from SOS data–or—monitoring data (15 most recent yrs. =2002-2016)	**_**	**0.33**	**0**
Avg. lethal take estimate = 12% of SOS birds not released	**2.16**	**0.04**	**0**
Adjustment for unobserved take (10% not searchable vs 50% typical)	**1.8**	**0.03**	**0**
Total annual lethal take from light attraction	**3.96**	**0.07**	**0**
Requested Annual Take	**4**	**0.2 (1 every five years)**	**0.033 (1 for 30 year permit)**
Requested Take Over Permit Term	**120**	**6**	**1**

Item 2. Select the requested take authorization and permit/license term coverage for each of the Covered Species.

Table 11: Newell's Shearwater:

Age Class	Annual Take Estimate: Fledglings	Annual Take Estimate: Adults or sub-adults	Take Limit for License/Permit Term
Mortality (Lethal)			
Injury (Non-lethal)			

Table 12: Hawaiian Petrel:

Age Class	Annual Take Estimate: Fledglings	Annual Take Estimate: Adults or sub-adults	Take Limit for License/Permit Term
Mortality (Lethal)			
Injury (Non-lethal)			

Table 13: Band-rumped Storm-Petrel:

Age Class	Annual Take Estimate: Fledglings	Annual Take Estimate: Adults or sub-adults	Take Limit for License/Permit Term
Mortality (Lethal)			
Injury (Non-lethal)			

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:

_____ 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 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

Kaua'i Seabird Habitat Conservation Program (KSHCP)

Participant Inclusion Plan (PIP)

Kauai Blue, Inc
(Sheraton 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.**

Applicant: Kauai Blue, Inc.

Physical Address: 2440 Hoonani Road, Koloa, Hi 96756

Mailing Address: 2440 Hoonani Road, Koloa, Hi 96756

Contact:	Security Manager	Joseph Kaneakua
	Address:	2440 Hoonani Road, Koloa, Hi 96756
	Telephone:	808-742-4067
	Email:	joseph.kanekua@sheraton.com
Alt. Contact:	Position:	Dan Sheldon
	Address:	2440 Hoonani Road, Koloa, Hi 96756
	Telephone:	808-742-3795
	Email:	dan.sheldon@sheraton.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 Sheraton Kauai 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.

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The Sheraton Kauai 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 current outdoor lighting at the Sheraton Kauai. 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 Sheraton Kauai Resort

Light Type Make & Model	Light output (e.g. lumens) & bulb type	Bulb Color	Quantity (No. Fixtures)	Location	Purpose of the Lights	Direction of Light angle (e.g. up, down, out)	Full cut-off/shielded fixture (y / n)	Time on/Time off
Parking lot pole light	bulb type & wattage LED / 20 watts	Color Warm White	39	Parking lot; front, rear & sides	Parking lot illumination – Safety & Security	Down	Yes	12 hr period Dusk - Dawn
Signage illumination flood lights/fluorescent tubes/lit internally	bulb type & wattage Ground lights/ 65 watts	Color white	6		Signage – directional purposes	Pointing to signs	Yes	12 hr period Dusk - Dawn
Wall-pack building lights	bulb type & wattage 20watts	Color White	332	Wall mounted	Building lights – Safety & Security	Up to ceiling & down to floor	Yes	12 hr period Dusk - Dawn
Landscaping & grounds accent floodlights	bulb type & wattage Par 38 type / 65 watts	Color Warm White	18	Entry; Courtyard; Pool; Beach Access; Flag Poles; other locations	Landscape illumination; accent lighting Function Events – Safety & Security	Down	No, but pointed down	12 hr period Dusk - Dawn
Short walkway Bollards	bulb type & wattage 20 watts	Color White	40	Walkways	Pedestrian guidance – Safety & Security	Diagonal	Yes	12 hr period Dusk - Dawn

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.

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. Luana 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.

Beyond assuring that lighting is adequate to address guest and employee safety and security in accordance with brand/company safety standards, there are no specific lighting standards, rules, restrictions or requirements to which the Resort must comply. 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 has no plans 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 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.

Table 3 - Light Attraction Alternatives to the Taking

Artificial Light Attraction Alternatives to the Taking Considered	Reasons Alternatives are not Being Utilized (provide justification)
▪ **Deactivate all outdoor artificial lights from dusk to dawn during the fledgling fall-out season September 15 to December 15**	Lighting is required for direction, safety, and security of the hotel grounds for guests, visitors, and employees.
▪ **Change operations to eliminate the need for outdoor artificial lighting (e.g., from nighttime to daylight hours)**	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.
▪ **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)**	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.
▪ **Other alternatives to the taking considered, if any. If facility is proposed, include alternative designs considered**	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.

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 4: Seabird Light Attraction Minimization Measures Considered

Minimization Measures Considered	Feasible? (Y / N)	If not Feasible to Implement Measures, Provide Reason
▪ Change time of light use (lights off earlier)	YES / No	Facility operates at all hours and grounds safety is required.
▪ Deactivate unnecessary lights	YES / No	
▪ Replace all outdoor lights with full cut-off fixtures	YES / No	Except lights that are very low to ground and shielded by vegetation.
▪ Shield all outdoor lights with full cut-off shields	YES / No	Except lights that are very low to ground and shielded by vegetation.
▪ Angle all lights downward	YES / No	Except lights that are very low to ground and shielded by vegetation.
▪ Lower intensity (lumens) of outdoor lights	YES / No	
▪ Change bulb color to non-white spectrum	YES / No	Warm tone lights are in use
▪ Prohibit/control unleashed predatory animals; prohibit outdoor feeding of animals; require sealed rubbish containers	YES / No	There are no unleashed animals on property, and trash bins have restricted coverings.
▪ Provide Worker Seabird Awareness Training to staff	YES / No	See Item 6, above, and Appendix C (Standard Operating Procedure).
▪ Provide outreach materials to staff & guests	YES / No	See item 6, above, and Appendix D (guest brochure).
▪ Host Save Our Shearwaters (SOS) Aid Station	YES / No	The Resort has hosted a SOS Aid Station for many years.

Item 8. <u>Minimization Plans</u>. 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 avoidance and minimization (Tables 4 & 5) 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 follows 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

List of Buildings	Minimization Measures	Cost to Implement	Responsible Staff	Timeline
Parking lot lights (39)	Lights are full cut-off fixtures; lights are down directed; poles are minimum height (25 feet)	N/A	Engineering	Completed
Signage lights (6)	Lights are downward angled; lights are low to ground (1-2 ft.); lights are low wattage	N/A	Engineering	Completed
Wall-pack lights (332)	Lights are angled down; lights are shielded (either by eaves overhang or retrofit shields)	N/A	Engineering	Completed
Landscaping & grounds lighting (18 pagodas and 40 bollard lights)	Most grounds and accents lights directed downward; others shielded by vegetation; grounds lights low to ground.	N/A	Engineering	Completed
Individual guest room interior lights	Avoidance Measures 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. 2. Encourage guests to cover room windows at night during fallout season Minimization Measures. 1. All guest room windows were tinted to reduce amount of light visible from the exterior.	N/A	Security	Completed

Table 6: Seabird Mortality Minimization Plan

Minimization Measures	Describe minimization method (e.g. trapping, outreach, enact policy)	Cost to Implement	Responsible Staff
Remove & control loose predatory animals at the facility. (Loose animals can kill grounded seabirds and this measure aims to prevent seabird mortality by animals.)	The Resort implements this measure. The resort deploys cat traps as needed.	N/A	Grounds department
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.)	The Resort implements this measure. Staff is trained that this is not allowed, and security monitors compliance	N/A	Management staff.
Conduct searches to recover downed birds at the property & turn them into SOS following protocols (see monitoring plan below).	See Item 9 below.	N/A	Engineering, grounds and security staff.
Train staff to follow minimization measures.	See Item 9 below, and Appendix C.	N/A	Management staff.

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 developed a Standard Operating Procedures (SOP) for patrolling, monitoring, documenting and reporting downed seabirds during the fledgling flight season. This document was updated in 2019 (see Appendix E, SOP attachment). 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 7 - Covered Seabird Take Monitoring Protocols

Please provide the following information for the protocol items below		
Item	**Protocol** (fill in protocol & provide reasons)	**KSHCP Guideline**
Percentage of the total property that will be searched & the total area to be searched	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*) located around the buildings. All open areas are visually checked by all associates while conducting their respective duties while on the site.	Search as much area as possible
Frequency of searches (# per day or per week)	The Resort is formally searched eight times a day by security, additional Seabird Awareness based searches are made 24/7 by associates.	Twice daily
Time of day of searches	Inspections are conducted throughout the day.	2-3 hours after sunset, and within 3 hours after sunrise
Number of searchers per search area	Two to three individual first responders as well as the entire staff of 200 or more employees	Depends on site conditions and safety considerations
Proposed training	See Items 7 and 9 above, and Appendix C.	Annual training covering seabird identification, seabird handling, response procedures, verified and documented

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)		
Item	**Protocol** (fill in protocol & provide reasons)	**KSHCP Guideline**
Location & description of the beach, or beaches, surveyed and the linear distance of the beach.	The beach fronting the Resort is approximately 2008 linear feet long, and is located fronting the luau garden and pool	Beach area surveyed should coincide with visibility from the facility with the lights.
Frequency of searches (# per day or per week)	The beach is searched a minimum of eight times a day by security officers.	Weekly during nesting season (typ. May 15 to end of August)
Number of searchers per search area	Various	Depends on site conditions and safety considerations
Proposed training	N/A. The hotel has never had nesting turtles on the beach.	Searchers should receive annual training conducted by the DLNR or the USFWS, or their designee.

Table 9: Green Sea Turtle 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)		
Item	**Protocol** (fill in protocol & provide reasons)	**KSHCP Guideline**
Frequency of searches (# per day or per week)	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.	Active nests should be monitored every 1-2 days; then daily during expected hatching date
Light avoidance	N/A	If lights cannot be deactivated or shielded from the nest, each nest should be screened from visible light.
Number of searchers per search area	Various	Depends on site conditions and safety considerations

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 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 the Sheraton Kauai 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

	Newell's Shearwater	Hawaiian Petrel	Band-rumped Storm-Petrel
1. Annual average number (SOS data – or – monitoring data) of downed NESH (5 most recent years), HAPE or BRSP (15 most recent years)	2.40	-	.07
2. Annual observed lethal take estimate (12% of 1, all downed birds)	0.29	0	0.008
3. Adjustment for unobserved take (10% not searchable vs 50% typical)	0.24	0	.07
4. Total estimated annual lethal take from light attraction (2+3)	0.53	0	0.078
Requested Annual Lethal Take	0.53	0	0.08

Requested Take Over Permit Term	**16**	**1**	**2.40**

Item 2. Select the requested take authorization and permit/license term coverage for each of the Covered Species.

Newell's Shearwater:

Age Class	Annual Take Estimate: Fledglings	Annual Take Estimate: Adults or sub-adults	Take Limit for License/Permit Term
Mortality (Lethal)			
Injury (Non-lethal)			

Hawaiian Petrel:

Age Class	Annual Take Estimate: Fledglings	Annual Take Estimate: Adults or sub-adults	Take Limit for License/Permit Term
Mortality (Lethal)			
Injury (Non-lethal)			

Band-rumped Storm Petrel:

Age Class	Annual Take Estimate: Fledglings	Annual Take Estimate: Adults or sub-adults	Take Limit for License/Permit Term
Mortality (Lethal)			
Injury (Non-lethal)			

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 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.

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.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

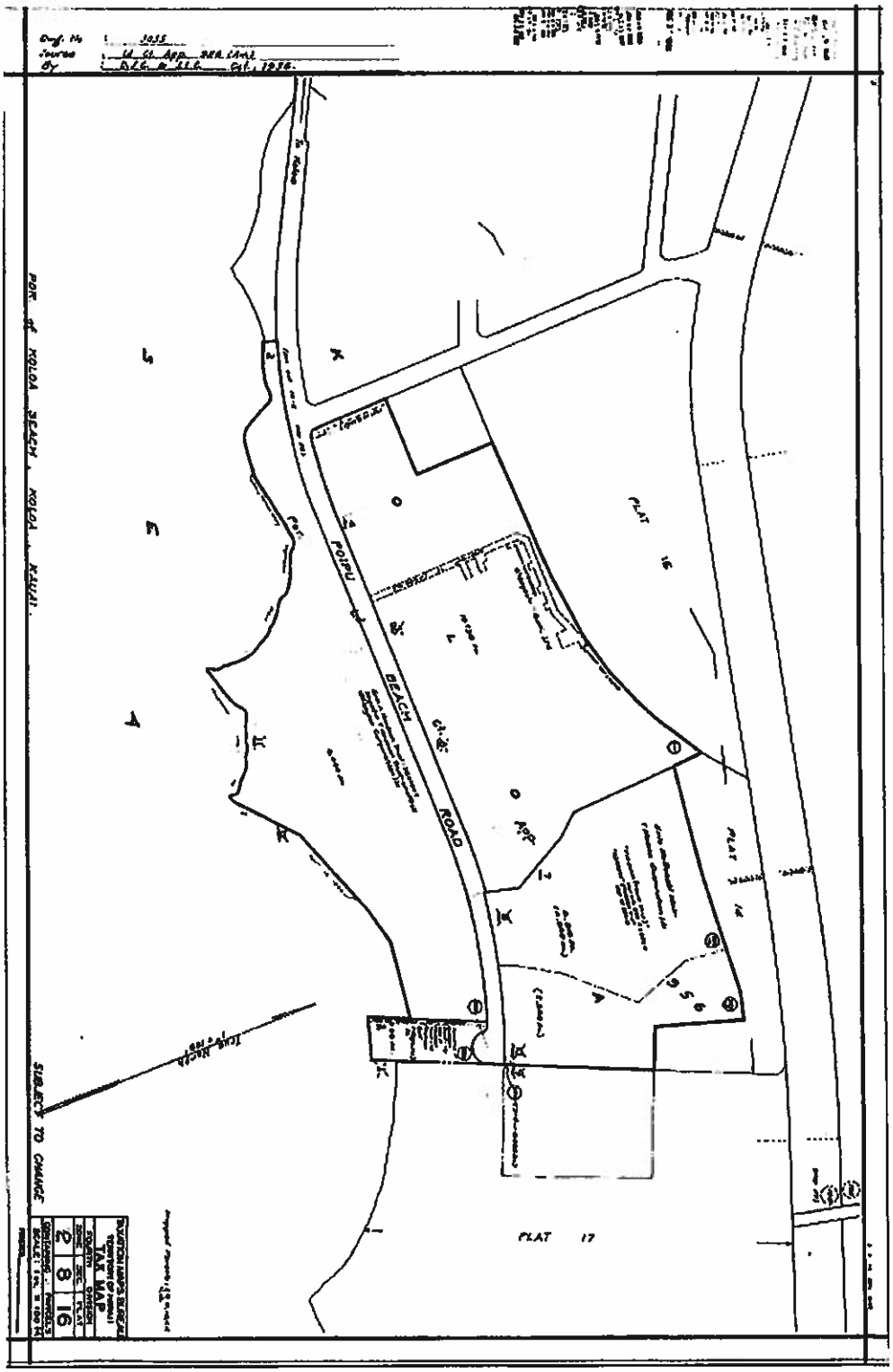
Appendix D – Guest Seabird Conservation Program brochure

Appendix E– Sheraton Kauai Resort – Seabird Standard Operating Procedures and Recovery Protocols

Appendix F – Downed Wildlife Form

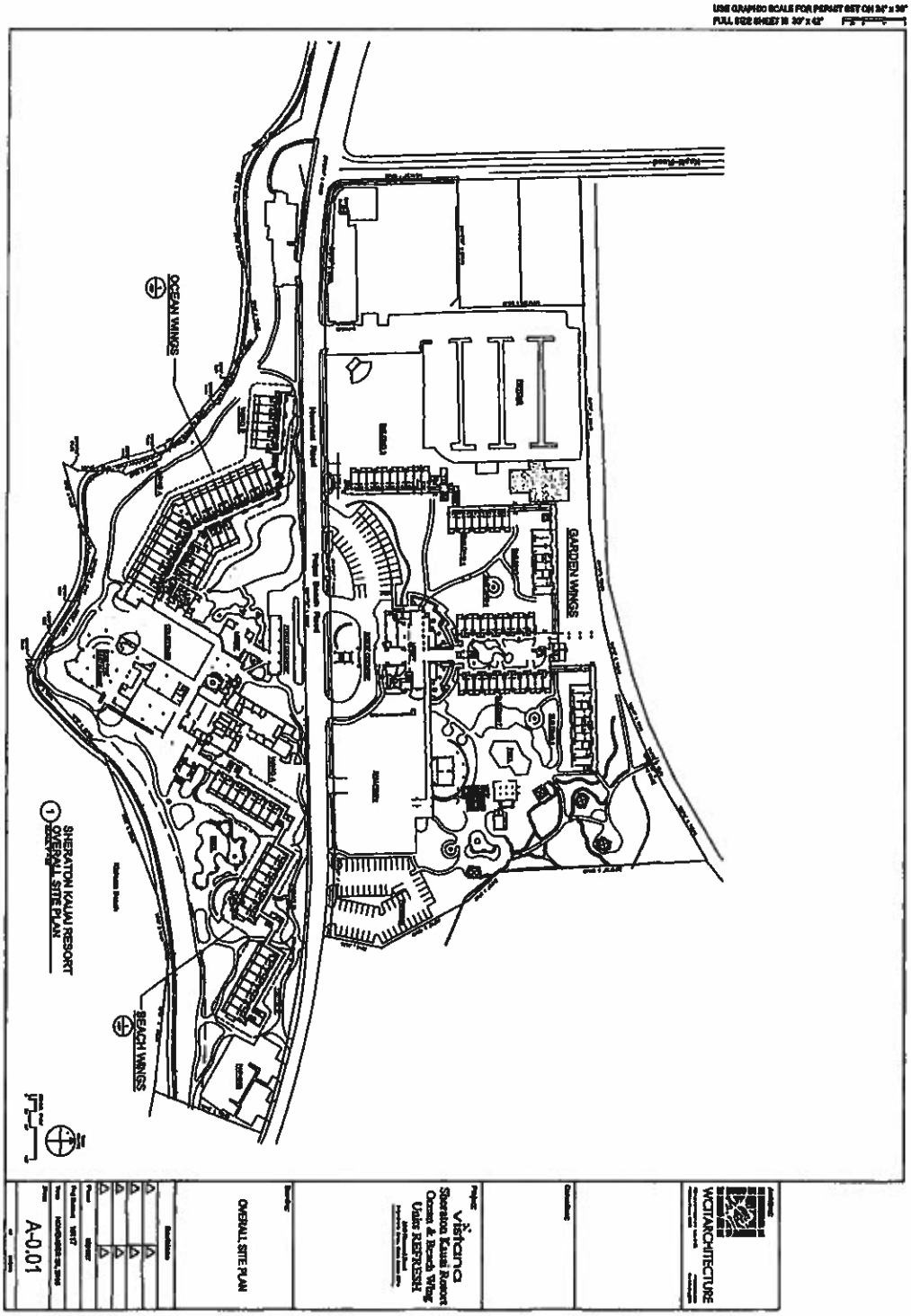
Appendix A

Sheraton Kauai Resort – Tax Maps



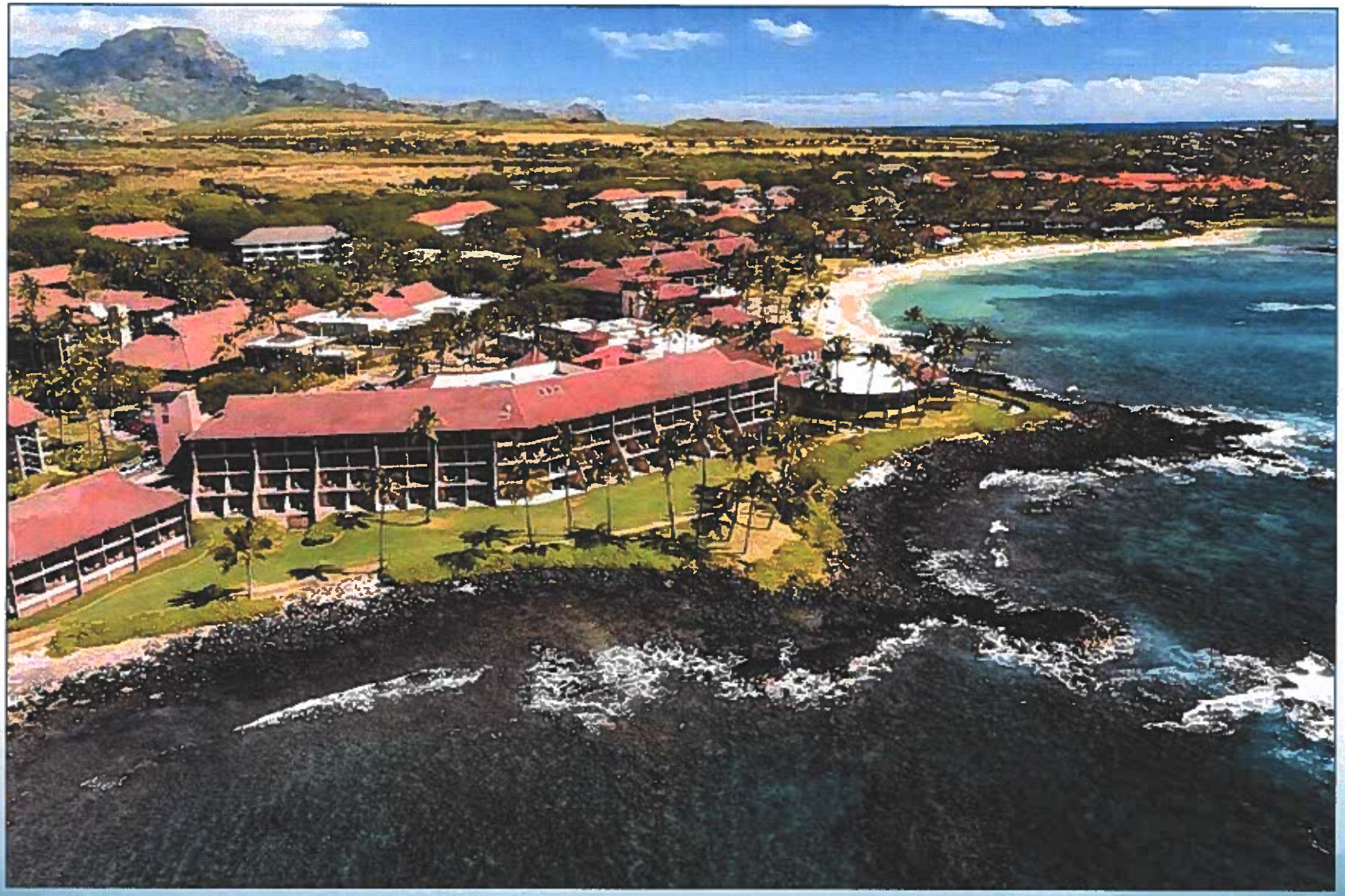
Appendix B

Sheraton Kauai Resort – Schematic Layout of the Resort



Appendix C

Sheraton Kauai Resort – Seabird Awareness and Response Training Module



Sheraton Kauai Resort Seabird Awareness and Response Training - 2019

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 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

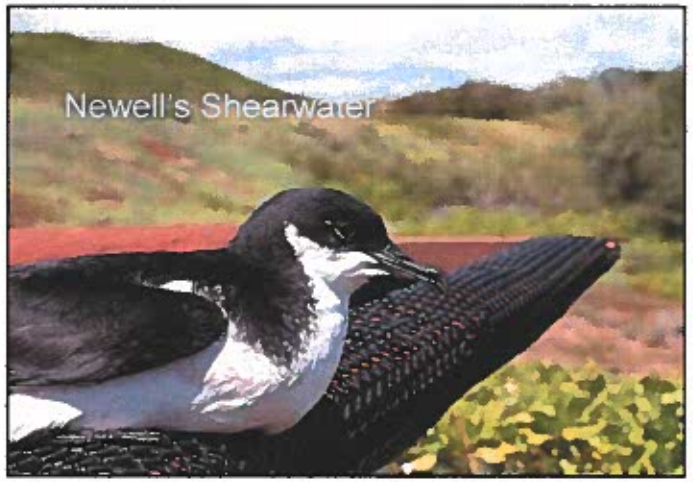
In house contact

Joseph Kaneakua: Security Manager Cell (808)346-8795

Consultant contact

Reggie David: Cell: (808) 937-0124, email: davidr003@hawaii.rr.com

Endangered and Threatened Seabird Species



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 may 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 and its associates will participate in the search, recovery of the downed Seabirds (Newell's Shearwater, Hawaiian Petrel, Band-rumped Strom-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 to help conserve native seabirds.

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 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, prior to the start of the annual seabird fallout season. Additionally it may be necessary to turn of certain specific lights during the seabird season – a SOP for which lights will be turned off will be developed if needed.

Security officers will keep a log of birds recovered on the property, with all pertinent data. They will also complete filling in 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 searching for down Seabirds during their respective shifts.

Security patrol duties include making two rounds of the property in an 8 hours period (shift). During their patrol during the Seabird Season, officers will make more comprehensive search of the property, and vegetated areas in landscaped areas.

A daily log will be submitted to the Security Manager of any downed birds found, at the end of each shift.

Security officers & engineering personnel will follow the "Bird Recover Procedure" detailed below when necessary.

Bird Recover Procedure:

Deploy the Seabird Recovery Kit that should contain the following items:

- Latex or nitrite gloves
- Three towels
- Hand Sanitizer
- Flashlight
- Clip Board, pen, "Bird Take Log
- Bird Carrier (Card Board 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 a SOS Aid Station
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 security, replace towel and clean cage with bleach, if dirty
10. Complete the Downed Wildlife Form
11. Turn in the completed form to the Security Manager
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 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 States 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 mailto:dofaw.hcp@hawaii.gov

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 Wildlife Form

This will be added prior to permit issuance, as this form has gone through many iterations