Final Environmental Assessment

KAUA'I ISLAND UTILITY COOPERATIVE
SHORT-TERM HABITAT CONSERVATION PLAN

PREPARED BY:
U.S. FISH AND WILDLIFE SERVICE

APRIL 2011

SUMMARY

In accordance with Section 10(a)(1)(B) of the Endangered Species Act (ESA) of 1973, as amended, Kauaʻi Island Utility Cooperative (KIUC) has prepared a Habitat Conservation Plan (HCP) to comply with incidental take permit (ITP) requirements of the U.S. Fish and Wildlife Service (USFWS). An incidental take license (ITL) must also be obtained from the State Department of Land and Natural Resources (DLNR) in accordance with Chapter 195-D of the Hawaiʻi Revised Statutes. If the ITP and ITL are issued, KIUC would be authorized for the incidental take of the federally endangered Hawaiian petrel (*Pterodroma sandwichensis*), the federally threatened Newell's (Townsends) shearwater (*Puffinus auricularis newelli*), and the band-rumped storm-petrel (*Oceanodroma castro*), a Federal candidate species that could become listed during the term of the permit in connection with the operation, maintenance, and construction of electric utility facilities.

Because the decision to issue an ITP is a federal action, it is subject to compliance with the National Environmental Policy Act (NEPA). As part of the NEPA process, an Environmental Assessment (EA) or an Environmental Impact Statement (EIS) is required to evaluate the potential environmental impacts of, and potential alternatives to, issuing an ITP and approving the implementation of the proposed HCP. This Final EA describes the existing environment on the Island of Kauaʻi; discusses alternatives to the Proposed Action (including the No-Action Alternative); and evaluates the impacts of the alternatives.

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1.0 INTRODUCTION

1.1 PURPOSE AND NEED FOR ACTION

Kauaʻi Island Utility Cooperative[1] (KIUC) has submitted an application to the U.S. Fish and Wildlife Service (USFWS) for an Incidental Take Permit (ITP) under Section 10(a)(1)(B) of the Endangered Species Act (ESA), as amended. Take of listed species is defined under the ESA to include harass, harm, wound, and kill. Section 9 of the ESA prohibits the unauthorized take of any endangered or threatened species of fish or wildlife listed under the ESA. However, the USFWS may authorize, under a permit, taking otherwise prohibited by Section 9 of the ESA, if such taking is incidental to the carrying out of an otherwise lawful activity and specific criteria defined under Section 10 of the ESA are met.

KIUC produces, purchases, transmits, distributes, and sells electricity on the Island of Kauaʻi, Hawaiʻi. KIUC is a public utility regulated by the Hawaiʻi Public Utilities Commission, and is required by law to provide and ensure the availability of reliable electrical service. KIUC owns and operates a variety of electric utility installations on the Island. These facilities include fossil-fuel-fired generating stations at Port Allen and Līhuʻe, the upper- and lower-Waiahi hydroelectric stations within the Wailua watershed, 7 electrical substations and 5 switchyards located throughout the Island, over 160 miles of electrical transmission lines, approximately 560 miles of 12.5 kilovolts (kV) electrical distribution lines, and approximately 425 miles of secondary lines (120/240 volts) that carry power from step-down transformers that are part of the electricity distribution network to individual homes and businesses on the Island. KIUC also purchases power from several independent power producers (IPPs) and transmits the power that is obtained from these sources through its electrical transmission system.

KIUC's electrical transmission and distribution system is largely above ground and consists of poles and wires that extend from 25 to more than 100 feet above the ground. The overhead wires and poles occupy airspace through which birds fly, and collisions between birds and these facilities have been documented. KIUC's existing facilities are known to have affected three species of seabirds that are protected by the ESA, the Hawaiʻi Endangered Species Act, and other Federal and State laws and regulations. Its other facilities, including generating stations, substations, equipment baseyards, offices, and other facilities are of less concern, but some take of seabirds has been attributed to them.

In 2007, KIUC submitted an application for a long-term (50-year) ITP. In response to that application, the USFWS concluded that additional information was needed to determine the effect of such a long-term take authorization on the affected seabirds and recommended that KIUC instead develop a short-term HCP. KIUC accepted the recommendation and prepared a short-term HCP. The short-term HCP approach allows for implementation of mitigation and recovery actions to provide benefits to the affected seabird species while additional information is gathered that is necessary to address their long-term management needs.

The species proposed to be covered by the ITP are the endangered Hawaiian petrel (*Pterodroma sandwichensis*), the threatened Newell's shearwater (*Puffinus auricularis newelli*), and the band-rumped storm-petrel (*Oceanodroma castro*), currently a candidate for listing under the ESA. All three species, hereafter referred to as the "Covered Species," are also listed by the State of Hawaiʻi as threatened or endangered species. These species nest and breed in certain inland locations on the Island but spend most of their lives at sea. They generally travel between land and sea during hours of darkness or near-darkness.

[1] The Kauaʻi Island Utility Cooperative (KIUC) is a not-for-profit, tax-exempt cooperative association governed by an elected nine-member Board of Directors. KIUC is entirely ratepayer-owned. KIUC was formed to purchase and operate the assets of the previous owner, Kauai Electric (KE) (a division of Citizens Utilities Corporation). KIUC completed the purchase of KE assets in November 2002.

In addition to collisions, urban lights (including streetlights that KIUC owns and operates on behalf of the County of Kauaʻi) can attract and/or disorient fledglings of the Covered Species as they make their first flights to sea. Birds that become disoriented by these lights can exhaust themselves by flying around the lighted areas before eventually landing, and can also collide with obstacles such as power lines, utility poles, buildings, and other tall structures. The Covered Species have very limited ability to resume flight from flat surfaces, therefore, once on the ground they are highly vulnerable to predation by dogs, cats, and other mammals, and to injury and death by vehicles, other human activity, or due to dehydration or starvation.

As noted above and discussed elsewhere in this document (see, for example, Sections 1.2 and 1.3 below), the harm that is caused by the collisions between the Covered Species and KIUC facilities is prohibited under both Federal and State laws unless permits are obtained. If granted by the USFWS, an ITP would authorize the incidental take of the Covered Species for up to 5 years from the time of permit issuance. KIUC is also seeking an Incidental Take License (ITL) under State law in accordance with Chapter 195-D of the Hawaiʻi Revised Statutes to address the impacts of KIUC's activities on the Covered Species. The ITL would be issued by the Hawaii Department of Land and Natural Resources (DLNR).

Pursuant to Section 10(a)(2)(A) of the ESA, an applicant for an ITP must develop, fund, and implement a USFWS-approved Habitat Conservation Plan (HCP). The HCP supports the issuance of the ITP and an ITL, and describes how the applicant will avoid, minimize, mitigate, monitor, and implement adaptive management provisions for the incidental take of the Covered Species that may occur during construction and operation of a proposed project. Because the decision to issue an ITP is a Federal action, it is subject to compliance with the National Environmental Policy Act (NEPA).

KIUC is seeking an ITP from the USFWS to provide regulatory assurance that implementation of its HCP and associated take of the Covered Species would comply with the ESA, while allowing KIUC to provide reliable electrical service to the Island of Kauaʻi.

Because KIUC operates an island-wide system, the ITP would cover the full geographic extent of the Island of Kauaʻi and all of KIUC's existing and certain planned activities and facilities within a 5-year time span (See Figure 1.1 and Figure 1.2). The relatively short-term (up to 5 years) for which coverage is being sought under the ITP request stems from the expectation that KIUC will seek to obtain long-term coverage through participation in the Kauaʻi Seabird Habitat Conservation Plan (KSHCP) being prepared by the State of Hawaiʻi DLNR under grants from the USFWS. A more detailed description of the activities and facilities proposed to be covered by the HCP and the associated ITP are provided in Section 2.2. A detailed description of the purpose and need for the KIUC Seabird HCP is provided in the Final KIUC Seabird HCP (Planning Solutions, Inc. et al. 2010).

1.2 PURPOSE AND NEED FOR THE FEDERAL ACTION

The USFWS purpose for this action is to:

- Respond to KIUC's application for an ITP for the Covered Species pursuant to the requirements of ESA Section 10(a)(1)(B) and its implementing regulations and policies;
- Protect, conserve and enhance the Covered Species and their habitat for the continuing benefit of the people of the United States;
- Provide a means and take steps to conserve the ecosystems depended on by the Covered Species;
- Ensure the long-term survival of the Covered Species through protection and management of the species and their habitat.

1.3 FEDERAL REGULATORY CONTEXT

The USFWS's need for this action is based on KIUC's need for an ITP because operation of its electrical transmission and distribution system, the presence of streetlights that KIUC owns and operates, and the other activities proposed by KIUC could result in take of the Covered Species.

1.3.1 NEPA AND EA PROCESS

NEPA provides an interdisciplinary framework for federal agencies to analyze and disclose the environmental impacts of their proposed actions and consider reasonable alternatives. Although the requirements of the ESA and NEPA overlap considerably, the scope of NEPA exceeds the ESA by considering impacts of a federal action on other natural and human resources besides endangered and threatened species and their habitats. Issuance of an ITP is a Federal action subject to NEPA compliance. If the USFWS determines that the environmental consequences of the proposed action evaluated in this EA are not significant, they would issue a Finding of No Significant Impact (FONSI). If the Regional Director determines that the environmental consequences of the proposed action are significant, the Regional Director would require preparation of an EIS.

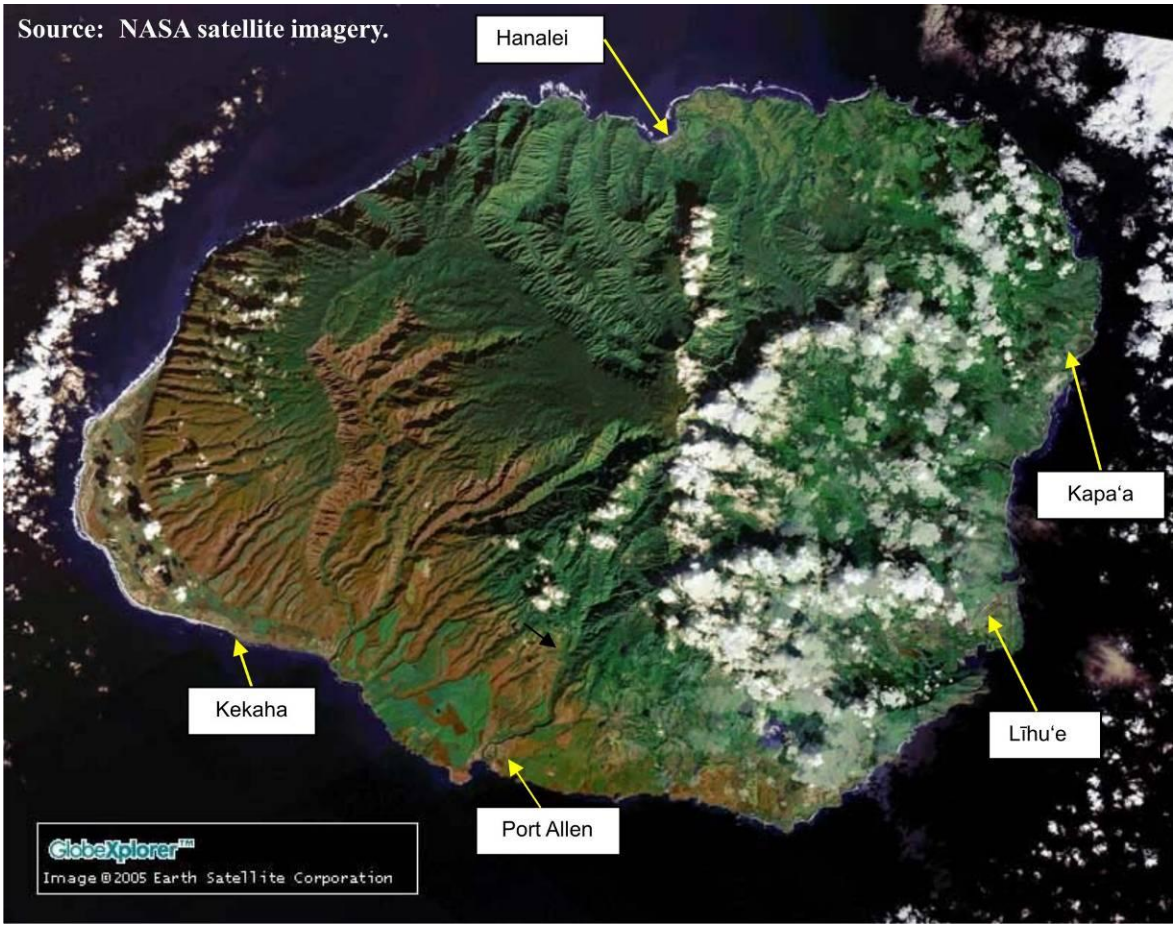
1.3.2 FEDERAL ENDANGERED SPECIES ACT

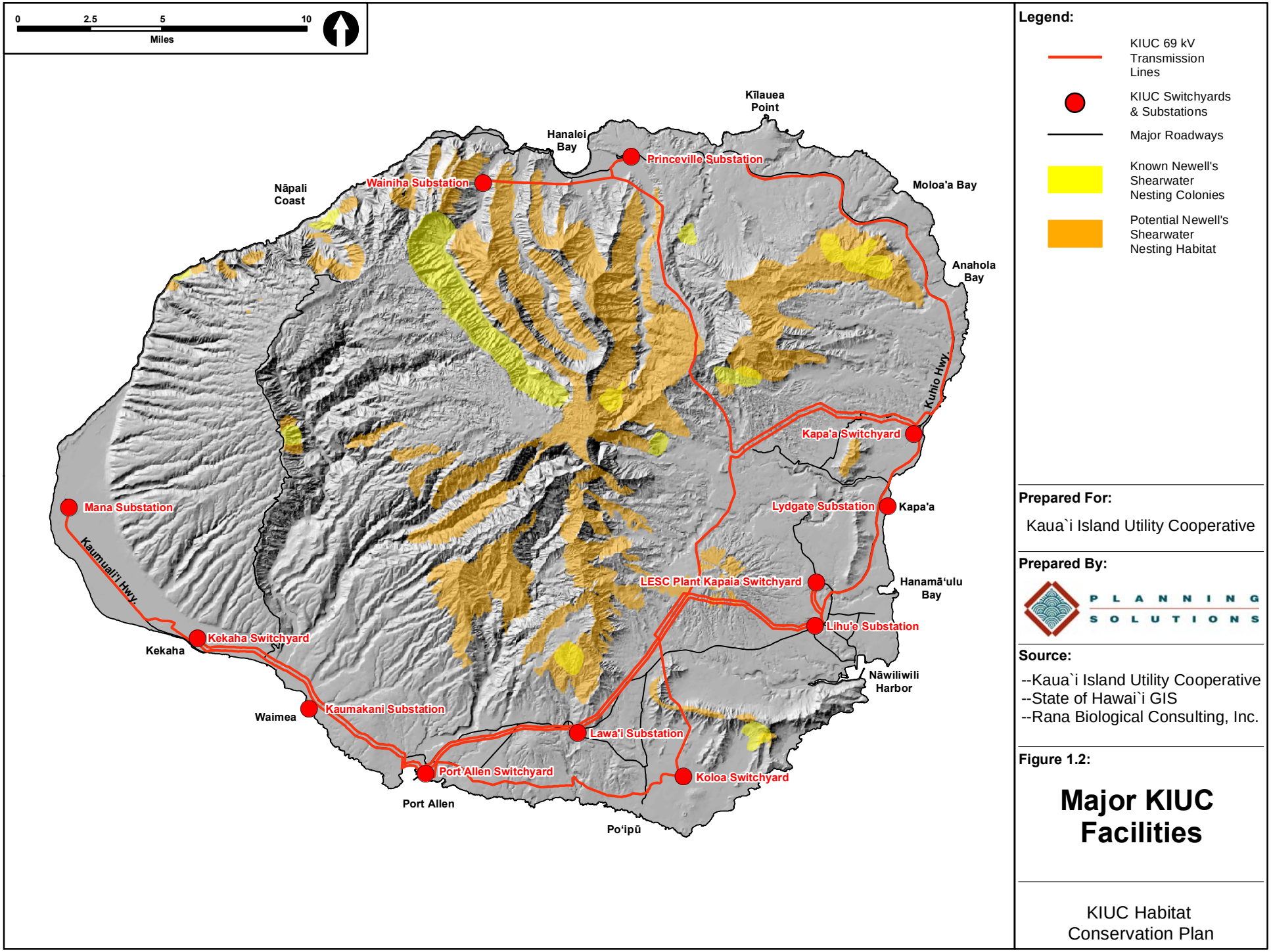
The ESA provides broad protection for plants, fish, and wildlife that have a designation as threatened or endangered in the U.S. or elsewhere. Section 9 of the ESA prohibits the unauthorized "take" of any endangered or threatened species of fish or wildlife listed under the ESA. "Take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect species listed as endangered or threatened, or to attempt to engage in any such conduct (50 CFR 17.3). "Harm" is defined by USFWS to mean an act which actually kills or injures wildlife, and may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering (50 CFR 17.3). "Harass" is defined to mean an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering (50 CFR 17.3). Section 10 of the ESA contains exceptions and exemptions to Section 9, if such taking is incidental to the carrying out of an otherwise lawful activity and outlines procedures for federal agencies to follow when taking actions that may jeopardize listed species.

1.3.3 FEDERAL MIGRATORY BIRD TREATY ACT

The three bird species covered in the HCP, and several other non-listed bird species in the Project vicinity, are protected under the Migratory Bird Treaty Act (MBTA) of 1918, as amended (16 USC 703-712). This act states that it is unlawful to pursue, hunt, take, capture or kill; attempt to take, capture or kill; possess, offer to or sell, barter, purchase, deliver or cause to be shipped, exported, imported, transported, carried or received any migratory bird, part, nest, egg or product. "Take" is defined as "to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect." No process for authorizing incidental take of MBTA-protected birds or providing permits is described in the MBTA (USFWS and NOAA 1996). In this case, if the HCP is approved and USFWS issues an ITP to the Applicant, the terms and conditions of that ITP will also constitute a Special Purpose Permit under 50 CFR 21.27 and any take of the three listed bird species would not be in violation of the MBTA.

Figure 1.1 Satellite Photo of Island of Kaua‘i.




0
2.5
5
10
Miles
Kīlauea Point
Hanalei Bay
Princeville Substation
Wainiha Substation
Nāpali Coast
Moloa'a Bay
Anahola Bay
Kuhio Hwy.
Kapa'a Switchyard
Kapa'a
Lydgate Substation
Mana Substation
Kaumuali'i Hwy.
LESC Plant Kapaia Switchyard
Hanamā'ulu Bay
Lihu'e Substation
Kekaha Switchyard
Kekaha
Nāwiliwili Harbor
Waimea
Kaumakani Substation
Lawa'i Substation
Port Allen Switchyard
Koloa Switchyard
Port Allen
Po'ipū
Legend:
KIUC 69 kV Transmission Lines
KIUC Switchyards & Substations
Major Roadways
Known Newell's Shearwater Nesting Colonies
Potential Newell's Shearwater Nesting Habitat
Prepared For:
Kaua`i Island Utility Cooperative
Prepared By:
PLANNING SOLUTIONS
Source:
--Kaua`i Island Utility Cooperative
--State of Hawai`i GIS
--Rana Biological Consulting, Inc.
Figure 1.2:
Major KIUC Facilities
KIUC Habitat Conservation Plan
Figure 1-2 Major KIUC Facilities 2009-11-16.mxd

1.3.4 FEDERAL NATIONAL HISTORIC PRESERVATION ACT

USFWS issuance of an ITP under ESA Section 10(a)(1)(B) is considered an "undertaking" covered by the Advisory Council on Historic Preservation and must comply with Section 106 of the National Historic Preservation Act (NHPA) (36 CFR 800). Section 106 requires USFWS to assess and determine the potential effects on historic properties that would result from the proposed undertaking and to develop measures to avoid or mitigate any adverse effects. Accordingly, USFWS must consult with the Advisory Council on Historic Preservation, the State Historic Preservation Officer (SHPO), affected Tribes, the Applicant, and other interested parties, and make a good-faith effort to consider and incorporate their comments into project planning.

The USFWS will determine the "area of potential effects" associated with the proposed undertakings, which are usually defined as the geographic area where the undertaking may directly or indirectly change the character or use of historic properties included in or eligible for inclusion in the National Register of Historic Places. The USFWS generally interprets the area of potential effects as the specific location where incidental take may occur and where ground-disturbing activities may affect historic properties.

1.4 PUBLIC INVOLVEMENT AND AGENCY COORDINATION

The USFWS conducted public scoping meetings in relation to KIUC's application for a longer term ITP in 2004 (USFWS 2004) and 2008 (USFWS 2007). The USFWS provided KIUC technical assistance as they developed the draft HCP, and KIUC met with local and federal agencies and non-governmental field biologists over the past several years in its efforts to obtain an ITP from the USFWS and an ITL from the State of Hawai'i Department of Land and Natural Resources. KIUC met with the State of Hawai'i's Endangered Species Recovery Committee (ESRC) on a number of occasions. Additional information concerning consultation is included in Chapter 6.0 of this document. On October 13, 2010, the Service published a Federal Register Notice of Availability (NOA) announcing a 45-day public review of the draft HCP and EA, which closed on November 29, 2010 (USFWS 2010). The HCP is KIUC's document and the EA is the Service's NEPA document that analyzes the effects of the proposed action of issuing an incidental take permit to KIUC based on its HCP and application package. KIUC did make some modifications in response to public and agency input while preparing its final HCP and this Final EA was modified accordingly. While the draft HCP and EA were out for public review, KIUC entered into a plea agreement with the U.S. Department of Justice (DOJ) over past violations of the ESA and MBTA that included, among other terms, a commitment to implement a subset of the minimization measures included in the HCP. Therefore, those specific actions are now considered components of both the Proposed Action and No-Action Alternative. A summary of all changes made to the draft EA are included in Appendix B.

2.0 ALTERNATIVES CONSIDERED

NEPA Section 102(2)(E) requires agencies to consider alternatives to the Proposed Action. The Proposed Action is issuance of the ITP by the USFWS. Alternatives to this action include the No-Action Alternative, issuance of a permit for a term longer or shorter than the five (5) years that are presently proposed, and issuing a permit that requires different minimization and/or mitigation measures than are included in the HCP. Only impacts anticipated as a result of the Proposed Action, No-Action, and an Alternative Permit Term shorter than under the Proposed Action are evaluated in detail in this EA. Reasons the other alternatives were rejected without further impact analysis are discussed in Section 2.4.

2.1 NO-ACTION ALTERNATIVE

The No-Action Alternative consists of the USFWS not issuing an ITP for KIUC's facilities and activities. Under this alternative, KIUC facilities would continue to affect Covered Species without authorization as provided for in Section 10 (16 USC 1539) and Chapter 195D, Hawai'i Revised Statutes (HRS). Under this scenario, the status quo would be maintained plus the elements of the plea agreement will be implemented. As described in detail in the HCP, KIUC has implemented many measures to avoid or minimize the effect that its facilities and activities have on the Covered Species. Examples include the conversion to full cut-off lights at its facilities and shielding the 3,000+ streetlights under its control. KIUC has evaluated its power lines in terms of risk of seabird collisions and tested the feasibility of marker balls and other bird-diverter devices. KIUC has for some time had in place policies designed to avoid adverse impacts on the protected species of seabirds, and it intends to continue these as appropriate. Under the No-Action Alternative, KIUC would continue to determine on an annual basis whether to voluntarily support the Save Our Shearwaters (SOS) Program (described in Section 2.2.3.3.1) as it has since 2005. KIUC would continue its efforts to minimize and avoid take of Covered Species. As a result of the plea agreement between KIUC and DOJ that was filed with the United States District Court for the District of Hawaii on December 2, 2010, all of the power line reconfiguration projects included in the Proposed Action, except for segments H-3 and H-4 in Table 2.4, will also occur under the No-Action Alternative. In addition, as part of KIUC's plea agreement, KIUC agreed to establish an escrow account of $50,000 to be used for the next 18 months to mitigate for the take of any protected seabirds by KIUC's power lines or lights. A process was established where for each bird proven to be taken by a KIUC power line or light and not successfully rehabilitated by SOS, KIUC must transfer $10,000 to NFWF for use in mitigating takings of seabirds on Kaua'i, whereas birds proven to be taken by some other entity and rehabilitated by SOS using KIUC funding will result in $1,000 offset to the account. KIUC has also agreed to replenish the escrow account as it is used, up to a total of $200,000. The terms of the plea agreement also require KIUC to install heat-sensing video camera along two power line segments. However, the "No Action" alternative would involve no new efforts on KIUC's part to mitigate for the take of Covered Species. Because incidental take would not be completely avoidable, it would leave the Applicant in violation of Chapter 195-D, HRS. If KIUC does not obtain an ITP by the end of the 18-month probationary period provided under the plea agreement, any ongoing incidental take will also be a violation of the ESA. In addition, the No-Action Alternative does not support KIUC's mandate to provide electrical service to the residents of Kaua'i and is also contrary to KIUC's fundamental purpose and objective as a business entity.

2.2 PROPOSED ACTION

The Proposed Action is the issuance of an ITP to provide incidental take authorization for activities covered by the HCP, including the continued existence, operation and maintenance of all existing KIUC facilities, the installation, operation and maintenance of certain future KIUC facilities and the measures described in the HCP to avoid, minimize, and mitigate the anticipated incidental take. The relatively short term (up to 5 years) for which coverage is being sought stems from the expectation that KIUC will seek and obtain long-term coverage through participation in the Kauaʻi Seabird Habitat Conservation Plan (KSHCP) being prepared by the State of Hawaiʻi DLNR under grants from the USFWS. Existing facilities and activities are described in Section 2.2.1 below, and future additional facilities and activities are described in Section 2.2.2.

2.2.1 EXISTING FACILITIES & ACTIVITIES

2.2.1.1 Overview

KIUC owns and operates a variety of electric utility installations on the Island. The locations of major KIUC facilities are depicted in Figure 1.2. These include fossil-fuel-fired generating stations at Port Allen and Līhuʻe, the upper and lower Waiahi hydroelectric stations in the Wailua watershed, seven electrical substations and five switchyards located throughout the island, over 160 miles of electrical transmission lines, approximately 560 miles of 12.5 kV electrical distribution lines, and approximately 425 miles of secondary lines (120/240 volts) that carry power from step-down transformers that are part of the distribution network to individual homes and businesses.

KIUC also owns and operates approximately 3,100 streetlights on behalf of the County of Kauaʻi that are all shielded to prevent light from escaping upwards. While these represent most of the streetlights on the island, a number of public facilities and private developments also own and operate streetlights that are not under KIUC's control.

2.2.1.2 KIUC Generating Stations

Port Allen Generating Station. The two largest facilities in the system are KIUC's two fossil fuel-fired generating stations. The Port Allen Generating Station is located on the southern side of the island near the town of ʻEleʻele (see Figure 2.1). It is the older of the two and, as shown in Table 2.1, has the most installed generating capacity (approximately 96 megawatts [MW]). In addition to the generating units, the facility includes a switchyard, offices, and warehouse space. The total area of the site is approximately 9 acres. The gas turbines, diesels, and steam plant at the Port Allen Generating Station are all fired on No. 2 diesel oil. The gas turbines are connected to a heat recovery steam generator and can be operated in both a simple-cycle and combined-cycle mode. Except for small on-site day tanks, fuel storage is provided through a contract with Chevron, which maintains a Tank Farm immediately *makai* (seaward) of the Port Allen Generating Station.

Kapaia Generating Station. The Kapaia Generating Station is located at the Līhuʻe Energy Service Center (LESC) in Kapaia on the outskirts of Līhuʻe (see Figure 2.2). At present, the 14-acre LESC site contains a 27.5 MW advanced steam-injected combined cycle power plant and support facilities, including fuel storage tanks, water treatment facilities, a control and maintenance building, warehouse and office space, and various mechanical and electrical equipment. The generating facility delivers electrical power to a switchyard at the southwestern corner of the LESC. A 1.1-mile-long transmission line that runs along an old cane haul road connects the switchyard to the remainder of KIUC's transmission system. In addition to these fossil-fuel fired generating facilities, KIUC also owns and operates two small hydroelectric units near Līhuʻe that it purchased from the Līhuʻe Plantation Company.

Table 2.1 Capacity and Location of Existing KIUC System Generating Units.

Location	*Unit Name*	*Year Installed*	*Capacity (MW)*
Port Allen Generating Station	Gas Turbine No. 1	1973	17.5
Port Allen Generating Station	Gas Turbine No. 2	1977	22.6
Port Allen Generating Station	Steam Plant	1968	10.00
Port Allen Generating Station	EMD Diesel 1	1964	1.8
Port Allen Generating Station	EMD Diesel 2	1964	1.8
Port Allen Generating Station	EMD Diesel 3	1968	2.7
Port Allen Generating Station	EMD Diesel 4	1968	2.7
Port Allen Generating Station	EMD Diesel 5	1968	2.7
Port Allen Generating Station	SWD 6	1990	7.85
Port Allen Generating Station	SWD 7	1990	7.85
Port Allen Generating Station	SWD 8	1991	7.85
Port Allen Generating Station	SWD 9	1991	7.85
Kapaia Generating Station	CT1	2002	27.5
Source: Kaua‘i Island Utility Cooperative, October 13, 2007.			

Figure 2.1:

Port Allen Generating Station

Prepared For:
Kaua'i Island Utility Cooperative (KIUC)

Prepared By:
PLANNING SOLUTIONS

Source:
State of Hawai'i GIS

Project:
KIUC System Habitat Conservation Plan

Landscape Corner Pane.cdr

Figure 2.2:

Kapaia Generating Station

Prepared For:
Kaua'i Island Utility Cooperative (KIUC)

Prepared By:
PLANNING SOLUTIONS

Source:
KIUC

Project:
KIUC System Habitat Conservation Plan

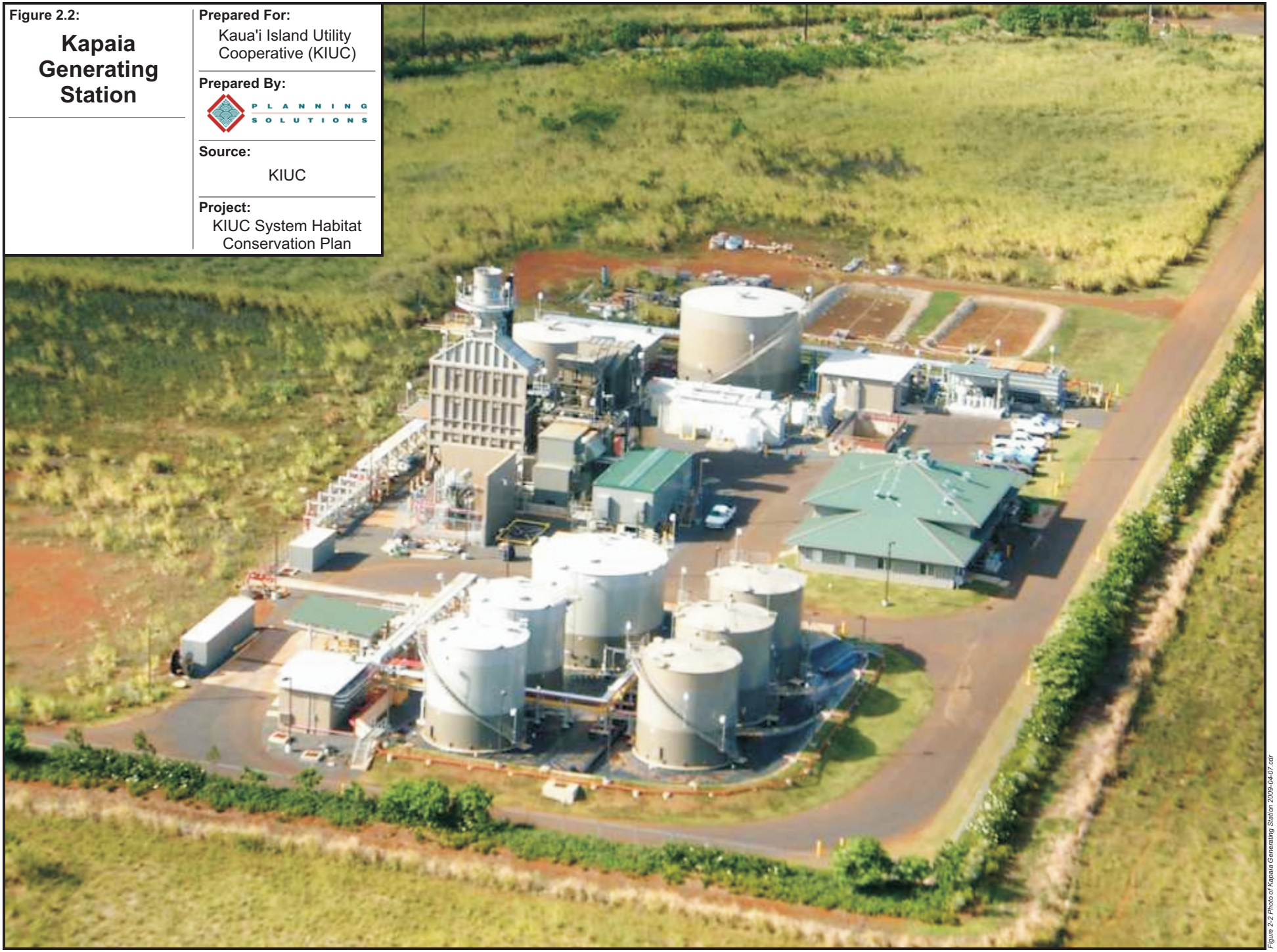


Figure 2-2 Photo of Kapaia Generating Station 2009-04-07.cdr

2.2.1.3 Electrical Switchyards, Substations, and Power Lines and Poles

2.2.1.3.1 Electrical Switchyards and Substations

KIUC's generating units produce energy at various lower voltages; this is then "stepped up" by power station transformers to a common higher voltage for transmission over long distances to grid exit points (substations). On Kaua'i the transmission is typically done at 57 kV.[2] Switchyards also serve as interconnecting and switching points for transmission lines and distribution circuits. Substations are used to reduce the voltage from transmission lines through "step-down" transformers and to route it to the areas where it is needed through distribution circuits. While they all perform similar functions, the electrical substations and switchyards in KIUC's system vary in age, size, and location with respect to existing urban development. Most are between one and two acres in size. They are all surrounded by 7-foot or higher chain link fences and all contain a variety of electrical transformers and switchgear that allow KIUC to step-up or step-down the voltage. The largest of the transformers are a little more than ten feet high. The tallest structures in most of the substations and switchyards are the structures that support wires coming into and out of the facilities; these are typically about 25 feet high.

The names and principal functions of equipment typically located at electrical switchyards and substations are as follows:

- *Power Transformers.* Electrical power transformers are used to raise or lower the voltage in electric power systems. The transformers found in electrical switchyards at KIUC's generating stations are "step-up" transformers that increase the voltage of the electricity to 69 kV. The transformers located in substations are generally "step-down" transformers that reduce the voltage to 12 kV. Finally, pole-mounted transformers reduce the voltage further to the 120/240 volts that is used by the ultimate customers. The system has a large number of these final low-voltage step-down transformers located closer to customers' as a way to minimize energy losses from the system.
- *Circuit Breakers*. These are mechanical switches capable of carrying electrical currents and of breaking the electrical connection when there is an electrical overload or other problem. In concept, these are like the circuit breakers that people have in their homes. However, because they must handle much greater loads, they are designed quite differently. The kinds of circuit breakers used on Kaua'i are generally less than 10 feet tall.
- *Electrical Busses*. Busses transfer power between two or more electrical circuits within a switchyard. They can be in the form of solid metal bars. Busses are chosen instead of conductors because they can carry high amounts of energy in a confined space.
- *Control Structures*. Some switchyards and substations have small (usually less than 10 feet by 20 feet) one-story structures that house control equipment. This room is air conditioned and has no windows. The control room is used to house equipment that monitors, controls, and communicates with the equipment (e.g., breakers, transformers, and switches) within the substation and also communicates outside of the substation. The equipment within the control structure usually consists of sensitive electronics such as panel meters, protective relays, control switches, remote terminal units (for remote communications), air-conditioner, and a battery bank for backup control power.
- *Communication Equipment.* Good communication is essential for the reliable operation of the system; fault-sensing protective relays must communicate to monitor the flow of power. Protection

[2] The 57 kV voltage is a non-standard level that the utility inherited from the plantation systems which it acquired when it was first created. That voltage is no longer in wide use, and so all of the equipment that has been installed for many years is designed to handle 69 kV. Once all of the old, lower-rated equipment has been replaced, KIUC will be able to energize its system at 69 kV. While the need to continue to supply customers while making the switch-over will make this a challenging task from an operational viewpoint, it will not require substantial construction or other activities relevant to the HCP. Hereafter in this document, all references to transmission facilities will be referred to as 69 kV.

of the transmission line from short circuits and other faults is usually so critical that KIUC uses its own communications links for some applications, and the equipment for this is typically located in the substations.

Photographs of typical switchyard and substation equipment, as well as various transmission and distribution line configurations are presented in Figure 2.3.

2.2.1.3.2 Utility Pole Heights and Cable Arrangements

The wire sizes and pole heights vary widely for each type of line according to the particular physical circumstances of their installation. Moreover, the configuration switches from one type to another (and often back again) within distances of as little as a few hundred feet. The changeability makes it impossible to map the differences on a system-wide scale.

- 69 kV transmission lines are typically carried on poles that are 70 to 85 feet tall. A wide variety of line arrangements are used. These include vertical arrays, where the wires are immediately above one another on the pole; diamond arrays, where cables are mounted on the top and on either side of the pole; and horizontal arrays, where the lines are mounted on horizontal crossarms or post type insulators. Sometimes lower-voltage distribution lines are mounted lower on the same poles.
- 12 kV distribution lines are typically on poles that are 40 to 60 feet tall. As with the poles carrying transmission lines, the electrical cables carrying the power are arranged in a variety of ways depending upon each pole's specific circumstances. Moreover, circuits frequently change from one configuration to another over a short distance. Small, pole-mounted step-down transformers make the final voltage reduction (to 120/240 volts) at which power is delivered to individual homes.

KIUC has a joint pole agreement with the telephone company providing for joint ownership of many of the poles in the KIUC system. The poles subject to this agreement carry KIUC lines and Hawaiian Telcom lines. KIUC's ITP application does not request incidental take coverage for telephone, cable, and other lines affixed to KIUC's poles. In addition to this joint pole agreement, KIUC also maintains and operates the majority of the streetlights that illuminate the island's roadways under agreements with State and County governments. KIUC bills the County and State monthly for their operation. The majority of these lights are on poles that also carry electric lines, but some of the lights are stand-alone fixtures on their own stanchions. Nearly all of the lights are switched on and off automatically by photo-sensitive switches installed in the individual lights.

KIUC also purchases power from several independent power producers (IPPs) and transmits the power through its electrical transmission system. IPP facilities and activities are not covered by the ITP.

Figure 2.3 Photographs of Substation & Switchyard Equipment.

PHOTO	PHOTO DESCRIPTION
	Typical steel transmission poles supporting twin, vertically stacked 69 kV circuits. Orange marker balls are visible on the lightening arrestor wire that extends from the top of one pole to the next. This segment is located near Hanahanapuni. Note large sag in wires associated with large pole-to-pole separation typically used in rough terrain.
	Typical wood pole, double-circuit 69 kV transmission line with single 12 kV distribution line under-build. The three wires in each of the transmission circuits are arrayed vertically (i.e., one above another). The distribution circuit uses three wires on a wooden crossarm. The thick cables low on the poles are telecommunication cables owned by others. This picture was taken west of Waimea town.
	Typical wood pole, single-circuit 69 kV transmission line with twin 12 kV distribution line under-build. The line crew is performing maintenance on the lines using a bucket-truck. The three wires in the trans-mission circuit are arrayed vertically (i.e., one above another). Each of the two distribution circuits has three wires on two separate horizontal wooden crossarms. The thick cables low on the poles are telecommunication cables owned by others. This picture was taken at ʻEleʻele.

Figure 2.3 Photographs of Substation & Switchyard Equipment.

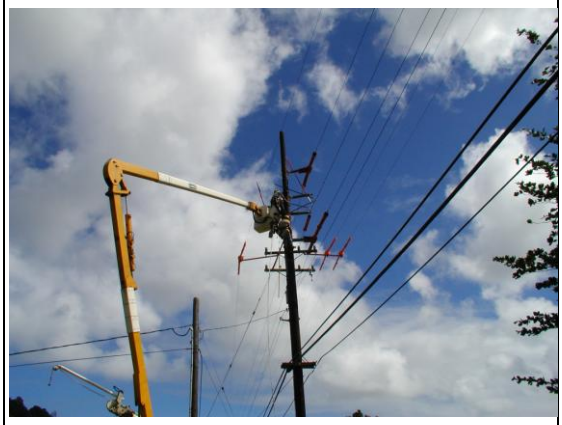
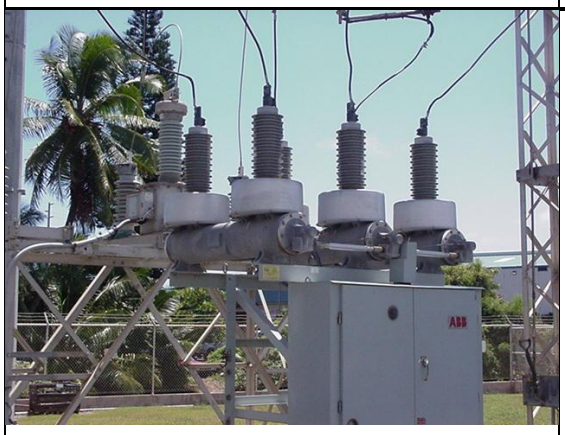
PHOTO	PHOTO DESCRIPTION
	Close-up of typical wood pole, single-circuit 69 kV transmission line with twin 12 kV distribution line under-build shown above.
	The green box in the foreground is a step-down transformer that reduces the 69 kV voltage used for transmission to the 12 kV voltage used in the electrical distribution system. It is approximately 11 feet high to the top of the bushings. This example is located in Kapa‘a and is typical of the many others are located in switchyards and substations around the island.
	This is a 69 kV transmission circuit breaker. This one, which is located in the Kapa‘a substation, is approximately 9 feet tall.

Figure 2.3 Photographs of Substation & Switchyard Equipment.

PHOTO	PHOTO DESCRIPTION
	This is the T-11 Distribution Bus at the Kapaʻa Substation. The maximum height of the structure is approximately 20 feet.
	On the left are typical steel pole transmission poles supporting twin, vertically stacked 69 kV circuits. These have a 3-wire 12 kV under-build arranged in a triangular configuration (one wire on one side of the pole and two on the other). Orange marker balls are visible on the lightening arrestor wire that extends from the top of one pole to the next. This segment is located at Kapaʻa. Note that there is much less sag in these wires than in wires in remote areas that have longer runs (i.e., distance between poles). These poles are approximately 85 feet tall, with the transmission lines separated from one another vertically by approximately 6 feet. The wood pole line on the right carries a three-wire 69 kV circuit in a triangular arrangement at the top with a 12 kV under-build, also in a triangular arrangement. The wood poles are approximately 75 feet tall. There are no telecommunications lines on any of these poles.
	This is a small transformer substation located at Mānā. The pole on the left carries a 12 kV distribution circuit arranged horizontally. The light green structure in the left-hand corner of the substation contains control and protection equipment. The A-frame structure immediately to its right supports the wires as they enter and leave the substation.

Figure 2.3 Photographs of Substation & Switchyard Equipment.

PHOTO	PHOTO DESCRIPTION
	Typical wood pole transmission line supporting twin, vertically stacked 69 kV circuits. These have a 3-wire 12 kV under-build arranged in a horizontal configuration (one wire on one side of the pole and two on the other). Thick telecommunications cables are supported on a horizontal crossarm on the lowest position on the poles. A single lightening arrestor wire extends from the top of one pole to the next, and the pole in the foreground has a small cylindrical transformer typical of those used to reduce the 12 kV distribution voltage down to the 120 volts used in homes and businesses; the service line from the transformer to the customer extends to the left off of the picture at a height of about 20 feet on the pole. This segment is located between Waimea and Kekaha. These poles are approximately 75 feet tall, with the transmission lines separated from one another vertically by approximately 6 feet.
	This is a close-up of one of the wooden poles shown on the previous picture.
	This is a "Power-Mini-Sub." It exhibits a dual pole structure which supports an elevated cross-member. The three barrel-shaped objects supported on the cross-member are voltage regulators. The overall height of the structure is approximately 40 feet; note that it is well below the top of the nearby vegetation. This facility is located in Wainiha.

Source: Compiled by Planning Solutions, Inc.

2.2.1.4 Ongoing Operation & Maintenance Activities

Existing KIUC facilities require ongoing maintenance to ensure safe and efficient operation. Most of the activities associated with maintaining KIUC facilities do not significantly affect the configuration of existing facilities and transmission lines. Examples of such maintenance include responding to mechanical failures of equipment within substations or on transmission lines due to corrosion and wear, replacing damaged and rotting poles, trimming tree branches near lines, and restoring and testing wood poles.

Some regular maintenance activities necessarily result in raising pole heights, relocating poles, and/or increasing the number of poles in the system. One example is "reconductoring", or the replacement of a smaller conductor with a heavier one. This must be done occasionally to accommodate increasing electrical loads on the transmission lines. In order to maintain a proper offset distance between the lines strung on the poles, the line height must be increased (usually by five feet) and/or the distance between poles reduced, which may entail replacing poles, adding more poles, and replacing insulators. KIUC is also required to move their facilities from time to time to accommodate road widening or other County and State projects. This HCP would cover the installation of up to 425 such new, replacement or relocated poles that result in a pole height increase (an average of 85 per year for five years), but not to exceed a maximum of 140 such poles in any one year.

Because lights attract the Covered Species, KIUC will only conduct work during nighttime hours in emergency situations If system conditions require non-emergency nighttime work during the autumn fallout season (September 15 through December 15), use of lighting would be restricted to between 10:00 PM and 4:00 AM, when very few of the Covered Species are flying between the ocean and inland nesting colonies (Cooper and Day 2003). Lighting of the work area will be required in such situations, but all lights will be shielded and directed downward to the maximum extent practicable. KIUC workers will 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.

As a part of their commitment under the proposed HCP, KIUC has instituted operational controls to ensure that take of Hawaiian hoary bats (*Lasiurus cinereus semotus*) bats does not occur in connection with vegetation management that it must carry out to keep its system operational. Consequently, except when it is necessary to correct a service problem, KIUC will only remove, disturb or trim woody plants taller than 15 feet between May 15 and August 15 each year if it has first confirmed the absence of bats. To confirm absence, an audio bat detector will be operated for one night within 100 feet of the vegetation to be disturbed. If no bat detections are recorded, the vegetation can be trimmed if done before the following night. If bats are detected, no removal/trimming/disturbance will be conducted in that area until the end of the pupping/rearing season.[3]

In the rare circumstances when removing/trimming/disturbing trees is necessary to correct a location-specific service problem (such as a trouble call reporting that a tree limb had fallen against lines or due to wind repeatedly striking a line, causing light flickering or breaker openings) during the bat pupping/rearing season, KIUC may do so without confirming absence of bats. In such instances, KIUC will only perform the minimum amount of tree trimming absolutely necessary to alleviate the immediate service problem; any additional tree trimming at that location will be postponed until after August 15. KIUC will provide monthly reports to the State Division of Forestry and Wildlife (DOFAW) and USFWS summarizing the results/locations where bat monitoring was conducted and will provide copies of the audio detector files at the end of each pupping season.

[3] At their discretion, agencies may approve the use of alternate bat detection technologies.

2.2.1.5 Implementation of the HCP's Conservation Program

Chapter 6 of the HCP describes a conservation program which, among other things, involves handling of and other activities involving the Covered Species. The Proposed Action includes implementation of all aspects of the conservation program.

2.2.2 FUTURE KIUC ACTIVITIES AND FACILITIES

KIUC is required by the State PUC to provide and ensure the availability of reliable electrical service. As Kaua'i's population and demand for electricity continues to grow, new facilities will be needed to improve the transmission and distribution of electricity. Some specific additional facilities are already slated for development, while others are in the early planning stages.

The HCP divides future additional facilities into three categories for purposes of incidental take authorization:

- Future additional facilities that are relatively minor in terms of size and extent, are constructed routinely, but are unlikely to have any observable or measurable effect on the Covered Species (e.g., a new distribution line to provide service to a new home). These facilities would be covered under the Proposed Action.
- Specific reasonably foreseeable future additional facilities that are larger in size and extent, already planned, and which KIUC expects it must begin to make substantial financial commitments within the term of the ITP that is being sought. These facilities are included in the Proposed Action.
- Other facilities that may be in KIUC's long-term facility plans but which need not be initiated within the period covered by the requested take permit. These facilities are not discussed in the HCP and are not included in the Proposed Action.

Because lights attract the Covered Species, KIUC will only conduct work during nighttime hours in emergency situations or when system conditions require nighttime work. Lighting of the work area will be required in such situations, but all lights will be shielded and directed downward to the maximum extent practicable. KIUC workers will 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 SOS facility.

If, during the term of the Proposed Action, the need arises to construct facilities that are not known at this time and are not, therefore, discussed in this document, KIUC will review the concept plans for such facilities to determine potential impacts to Covered Species. Only those presently unidentified projects which it is clear (either from analysis or from discussion with the regulatory agencies) will not cause harm will be pursued without seeking additional permit coverage. Implementation of any projects which KIUC determines will require incidental take authorization for the Covered Species will be delayed until that coverage is available, either through participation in the *KSHCP* or through a separate permit process. If, during the term of the ITP, KIUC determines that a particular new activity/facility will not require incidental take authorization, impacts due to those facilities, should they occur, would not be authorized unless the ITP is amended to include them.

Facilities and activities in each of the two categories for which ITP coverage is being sought are discussed in detail below.

2.2.2.1 Future Additional Facilities: Categories of Covered Minor Facilities

The following categories of routine KIUC facilities and activities necessary to serve the utility's customers are minor in size and extent and, due to their physical attributes, have extremely limited, if any, potential to affect the Covered Species. The construction and operation of these facilities are included in the Proposed Action.

2.2.2.1.1 New Connections within Existing Service Areas (< 1,320 feet)

New residential and commercial customers regularly request new connections to the existing electrical distribution network. The USFWS understands that KIUC is obligated by the PUC to provide the requested service from the nearest distribution line to the customer. Approximately 75 percent of these requests can be satisfied by installing 50 to 125 feet of new wire from an existing pole or line to the customer's meter. The remaining requests typically require installation of one to three poles (and often a transformer), but they are occasionally longer. The poles used for this purpose typically extend no more than 35 to 40 feet above ground, and the service lines from poles to homes typically start from the pole at a takeoff height of approximately 30 feet above the ground and descend to attachment points on the eaves of homes at about 8 feet above the ground. Hence, their average height above the ground is under 20 feet.[4] Under the proposed HCP, if any such new connections require the installation of new poles that extend higher than 45 feet above ground level, KIUC will submit the proposed exception to USFWS and DOFAW for review and approval. If an agency objects to the proposed exception, it must notify KIUC of its objections within 30 calendar days of receipt of the request. The agencies may request up to ten (10) additional business days of review time so long as they submit their request for an extension no later than 25 calendar days after their receipt of KIUC's request. If the Agencies do not respond within the allotted time, their lack of response will mean the Agencies have no objection to KIUC's request. The Proposed Action would cover the installation of up to 375 new connection poles over five years (an average of 75 per year), but not to exceed a maximum of 150 new connection poles in any one year. To limit the number of new connection poles that could be installed in the darker North portion of the island (west of Princeville), no more than 13 new connection poles will be placed in the area west of Kumu Road and Highway 56 during the five-year permit term, or no more than five in any one year. The limitation on the number of additional new connection poles (and new lights) is based on the proportional area occupied by the KIUC service area within the darker North portion of the island (approximately 3.47 percent). In the Annual Report prepared pursuant to Section 7.2.3 of the HCP, KIUC will include a list (with locations, pole heights and line heights) of all new connection poles installed during the preceding year.

2.2.2.1.2 Electrical Equipment Additions to Existing Substations and Switchyards

Periodically, KIUC must install additional electrical equipment in its existing substations and switchyards. In some cases the need stems from KIUC's ongoing conversion from 57 kV to the 69 kV transmission system that is more compatible with standard equipment now being produced by electrical equipment manufacturers.[5] In other cases the equipment additions are related to the need to expand the substation capacity to meet growing electrical demand.[6] The tallest additional equipment that might be installed at a substation is less than 20 feet high.

2.2.2.1.3 Minor Generating Station Equipment and Structure Additions

Mechanical and electrical equipment must periodically be added to generating stations to accommodate changes in operating procedures, improved technology, or governmental permitting requirements. This equipment is typically less than 25 feet high (i.e., well below the height of existing structures on the generating station sites). Low structures containing space for storage (e.g., warehouses), offices, training, and other utility related activities may also be added from time to time to allow the facilities to carry out their functions. Some of these may involve a few, low-intensity outdoor lights. Any new lights will be shielded and used only when needed.

[4] 30 feet above ground level at pole less 8 feet above ground level at roof/2) = 19 feet.

[5] KIUC has nearly completed the equipment changes needed to convert its transmission voltage from 57 kV to 69 kV. Once the remaining transformers, switches, and other remaining 57kV-rated equipment have been replaced, the cooperative will increase the line voltage of its transmission system. This will not require modifications to equipment that have the potential to affect the Covered Species.

[6] Some of the growth in demand is due to additional development, but much is due to the increased per-capita use of electrical power.

2.2.2.1.4 Voltage Upgrade on Existing Poles

As discussed above, while the island's electrical transmission system was initially designed to operate at 57 kV, all of the new facilities installed over the past several decades have been designed to 69 kV standards to facilitate eventual conversion to this industry-standard voltage. Hence, it will not be necessary to modify transmission lines if and when a complete voltage conversion to 69 kV is made. Instead, relatively straightforward changes in connections at substations will suffice. The steel transmission poles along KIUC's main transmission corridor across the center of the island have been designed so that they could accommodate 138 kV should the utility reach the point where this is needed to reduce line-losses and increase long-distance transmission capacity.

2.2.2.1.5 Installation of Shielded Street Lights at Government or Private Request

KIUC periodically receives requests from the County and State agencies to install and operate additional streetlights to serve new subdivisions or existing thoroughfares. In some cases the streetlights that are installed in new developments to comply with County code requirements are on their own poles, with electrical and telecommunications cables being placed underground.[7] In other cases the lights are placed on poles that also carry overhead electrical and telecommunication cables. The Proposed Action provides for obliging those requests and responding to them in a timely manner. As with all the existing KIUC-owned streetlights on Kauaʻi, any new streetlights would be equipped with full-cutoff lights to eliminate upward-projecting light that could disorient seabirds. The HCP would cover the installation of up to 375 new shielded streetlights over five years (an average of 75 per year), but not to exceed a maximum of 100 new shielded streetlights in any one year. To limit the number of streetlights that could be installed in the darker North portion of the island (west of Princeville), no more than 13 new lights will be placed in the area west of Kumu Road and Highway 56 during the five-year permit term, or no more than three in any one year. The limitation on the number of additional new lights (and new connection poles) is based on the proportional area occupied by the KIUC service area within the darker North portion of the island (approximately 3.47 percent). In addition KIUC will forward to the USFWS and DOFAW, within five business days, all requests and/or applications it receives to install new streetlights. This will provide the USFWS and DOFAW with the opportunity to evaluate the requested new streetlights, and then contact the requesting entity should the Agencies have any concerns. In the Annual Report prepared pursuant to Section 7.2.3 of the HCP, KIUC will include a list (with locations) of all new streetlights installed during the preceding year.

2.2.2.1.6 Fiberoptic Cable Installation

KIUC is continuing to install fiberoptic cables that link major facilities in its system. These will complement fiberoptic cables it has already installed linking the Port Allen Generating Station, Kōloa Switchyard, Līhuʻe Switchyard, Hana Kukui Main Office, Kapaia Power Station, Lydgate Substation and Kapaʻa Switchyard. The additional communication ability will increase the stability of its transmission and distribution system and have the added benefit of improving other types of communication between its major facilities.

These fiberoptic cables come in two forms: ADSS (All Dielectric Self Supporting) and Optical Ground Wire (OPGW). ADSS fiber cable has its strength built in and requires no externally lashed messenger; it is installed on existing utility poles, either in the space allocated for communication lines (approximately 21 feet above the ground) or at the lowest position in the electrical space (approximately 27 feet above the ground). OPGW (which looks like a normal aluminum stranded cable) is usually strung at the top of the pole, in place of the static wire. It provides both lightning

[7] As provided for under existing PUC guidance, KIUC installs new transmission and distribution lines overhead unless the landowner or developer requests that they be placed underground. Where such requests are made, the developer pays the cost differential between underground and overhead installation.

protection and fiber communications. KIUC will continue to install OPGW fiber conductors in place of the existing static wire – in situ.[8]

2.2.2.1.7 In-situ Replacement of Existing Lines or Other Facilities

KIUC is periodically required to replace existing lines or other facilities in their current location for maintenance, service reliability or other such reasons. For example, KIUC on occasion must replace an existing segment of power line because of line age or damage. So long as the line is replaced in its current location, and the new line is installed at a height which is equal to or lower than that of the line being replaced, then the installation and operation of that new line segment is covered by the incidental take permits.

KIUC normally performs *in-situ* replacement work during daylight hours. It will only conduct such work during nighttime hours in emergency situations or when system conditions require nighttime work. Lighting of the work area will be required in this situation, but all lights will be shielded and directed downward to the maximum extent practicable. KIUC workers will 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 SOS facility.

2.2.2.2 Future Additional Facilities: Larger, Planned, Short-Term Projects

KIUC has committed to, or may need to commit to, a few new facilities within the term of the permits that are larger in size and extent than the categories of facilities described above, but are sufficiently well defined such that the construction and operation of these facilities would be Covered Activities under the HCP and thus part of the Proposed Action.

2.2.2.2.1 Aepo (formerly Kumanu) Substation

The South Shore of Kauaʻi is presently served by KIUC's electrical substations in Kōloa and Lāwaʻi, both of which are already operating near their full capacities.[9] Construction has begun on the first phase of the Kukuiʻula project, a 1,000-acre master planned resort/residential community, and other development is ongoing in the region as well. Additional substation capacity is being installed to accommodate the increased load resulting from this development. In addition to supporting anticipated area loads, the new substation will also provide redundancy for the Kōloa, Lāwaʻi, and Port Allen Substations during the next decade or more.

The new electrical substation will be located on a portion of TMK: 2-6-003:001 adjacent to an existing field road and next to a 69kV overhead transmission line (see Figure 2.4). It is approximately six miles from the switchyard at the Port Allen Power Plant and three miles from the Kōloa Substation. The electrical substation site is in the State Agricultural District; it is designated as Agricultural by the Kauaʻi County General Plan and by County Zoning. The new substation will require one acre of land and is planned as an outdoor station with two 69kV circuit breaker line terminals, one for each 69kV line exiting the station. Full build-out of the substation is designed with three power transformers and six 12.5kV distribution circuits. Initial construction will only employ one transformer and two distribution circuits.

Most of the equipment in the proposed substation is quite low, with all of the transformers and switches being less than 20 feet in height. The tallest structures, the two A-frames that hold the incoming and outgoing electrical lines, are less than 40 feet tall. The only outdoor lighting at the site would be for emergency use only and would be provided using shielded fixtures.

[8] For those locations where existing static wires are not already installed, KIUC will pursue the procedures outlined in 2.2.4 for future additional facilities.

[9] The original Kōloa Substation was expanded in 1982 to meet increased load demands in the Kōloa and Poʻipū areas. The expanded Kōloa Substation contains two 7.5/10.5 MVA power transformers and four 12.5kV distribution circuits. The station is presently loaded to over 80 percent of its base rating, which exceeds the load the substation can reliably support during peak-load periods. The Lāwaʻi Substation provides limited redundancy for Kōloa Substation; however, during peak periods Lāwaʻi Substation also operates near maximum capacity.

2.2.2.2.2 Lydgate Substation Upgrade

KIUC's existing Lydgate substation is on the eastern side of Kauaʻi approximately one mile south of the Wailua River and approximately a quarter of a mile inland from the ocean. The substation serves portions of the County's Kawaihau and Līhuʻe Planning Districts, including Waipouli, Hanamāʻulu, Wailua Houselots, and Wailua Homesteads. The project is placing nearly all of the equipment in a new indoor enclosure; only the transformers will remain outside (two initially with space for a third if needed). KIUC expects the work will be completed before the ITP is in effect and, therefore, impacts due to the substation upgrade are not analyzed in this assessment, but the impacts from its continued operation are included and would be covered under the ITP. The modernized transformer station will reduce the maintenance costs and visual impacts associated with the facility and will reduce the potential for equipment failures, thereby enabling KIUC to continue providing reliable electrical service to the Wailua area of Kauaʻi. KIUC plans on maintaining the landscaping buffers that surround the site, and make only minor alterations to the overhead wire connection between the substation and the adjacent 69 kV electrical transmission line.

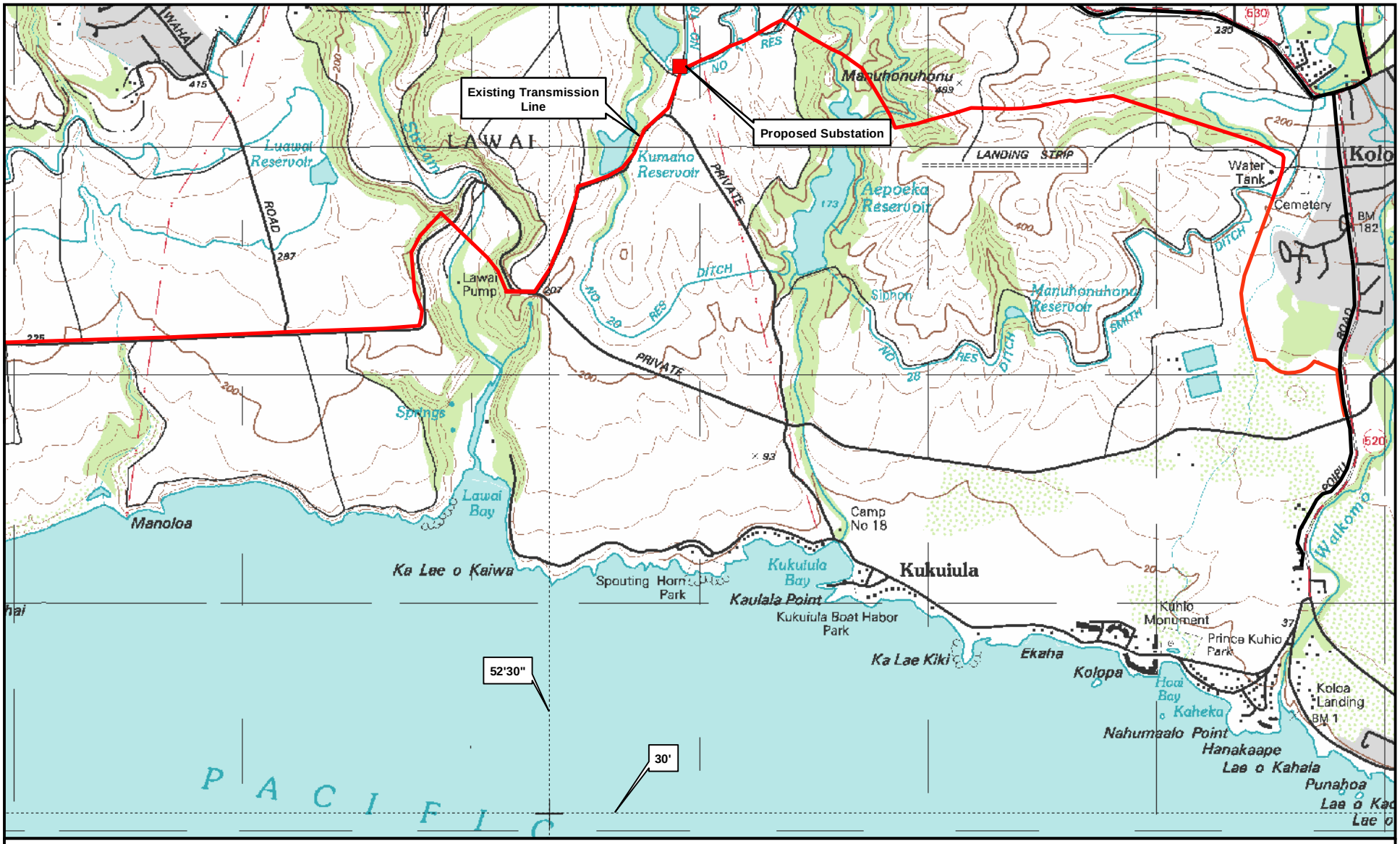
The replacement facility has fewer and lower overhead wires and other structures than the previous facility. It did not require physical changes to the overhead electrical transmission and distribution system aside from replacement of the existing wires. No change in street lighting was needed. The only outdoor lighting at the site is for emergency use only using shielded fixtures.

2.2.2.2.3 North Shore Reliability Enhancement Project

The first power line on the North Shore of Kauaʻi was a 35-mile line connecting Wainiha Hydro with McBryde Sugar Company's irrigation system pumps located on the Hanapēpē River. The line was completed in 1906 and remained in service for over thirty years. In 1938, the original line was replaced with a steel lattice tower line, a part of which is still in service between Wainiha and Hanalei. The lattice tower line operation was changed from 33 kV to 57 kV in 1938.

Growth on the North Shore and a deteriorating lattice tower line prompted KIUC's predecessor, Kauaʻi Electric (KE) to undertake two large transmission line projects in the early 1990s. One of these is a 69 kV steel-pole line that runs from the Hanahanapuni Tap to the Princeville Substation that was reconstructed in 1992-1993 following Hurricane ʻIniki. In 1991 KE began construction of a 69 kV wood pole line to connect the Kapaʻa Substation to the Princeville Substation. The twenty-mile line was designed to run alongside Kūhiō Highway and Kalihiwai Road. Approximately 16 miles of the line had been built when local opposition caused KE to suspend construction, thus creating a gap of approximately 4.5 miles.

The Princeville Substation, which serves the area from Hanalei to Moloaʻa, is fed by just one 69kV transmission circuit. A second 69 kV circuit is required to enable KIUC to provide reliable service to Princeville, Hanalei, Kīlauea, and other communities within this service area. The need for the additional transmission circuit will increase as development of the area between Kapaʻa and Princeville consumes more and more of the power that can be supplied by the existing Kapaʻa 12 kV distribution system, and thereby reduces the amount of power that the existing Kapaʻa 12 kV system can transmit to Kīlauea, Princeville, and beyond on those occasions when power from the 69 kV circuit is not available.



Prepared For:
Kaua`i Island Utility Cooperative (KIUC)

Prepared By:
PLANNING SOLUTIONS

Sources:
-KIUC
-USGS 7.5' Quad Map

Legend:

69 kV Transmission Line

0 0.25 0.5 1
Miles

Figure 2.4:

Proposed Aepo Substation

KIUC Habitat Conservation Plan

The USFWS understands that KIUC identified and evaluated options it could pursue to improve service to its customers in this area in a manner that is cost-effective, environmentally sound, and responsive to community concerns. After identifying the operational objectives for the second 69 kV circuit and identifying factors that shape the project environment and influence the appropriateness of alternative solutions, the study team explored ways to meet the operational objectives in light of the many economic, community, and ecological constraints that exist. KIUC evaluated the 12 alternatives it identified from four perspectives: engineering and operations, cost, community compatibility, and ecological compatibility (specifically including minimization of impacts to threatened and endangered birds that may collide with power lines). While the study generated 12 alternatives, its ensuing analysis of the twelve identified four alternatives as best with respect to their ability to meet KIUC's objectives. The four best alternatives and their respective construction costs (rounded up to the next-highest $100,000) are:

- KV-9. New 69 kV Overhead Line along Kalihiwai road; Existing Three-Wire 12kV circuit converted to single-wire Aerial Cable - $1.2 million.
- KV-2. New 69 kV Overhead Line along Kūhiō Highway & Private Right-of-way - $1.4 million.
- KV-5. New 69 kV Overhead Aerial Cable along Kūhiō Highway with attachment to Kūhiō Highway Bridge across Kalihiwai Valley - $2.2 million.
- KV-6. New 69 kV Overhead Spacer Cable along Kūhiō Highway with attachment to Kūhiō Highway Bridge across Kalihiwai Valley - $1.3 million.

Alternatives KV-5 and KV-6 would have very low potential impacts to the Covered Species, as they involve the installation of a low altitude aerial cable (KV-5) or spacer cable (KV-6) that would largely be shielded by vegetation, and which would cross the Kalihiwai Valley by being attached to the Kalihiwai Bridge. Alternative KV-9 would have a low to moderate impact on the Covered Species, as it would be installed at approximately the same height as the existing power lines in that location. Alternative KV-2 could have a slightly different impact on the Covered Species in that its height along the eastern slope of Kalihiwai Valley and over the Kalihiwai River could pose a hazard to birds flying through the Kalihiwai Valley. In all cases where additional above-ground lines are proposed, KIUC would offset the effect of the additional circuit by reconfiguring the existing 12 kV distribution wires so that they are arranged horizontally (in lieu of their present vertical arrangement), thereby reducing the potential for bird/line collisions.

After evaluating each of these alternatives, KIUC decided to utilize Alternative KV-5 or Alternative KV-6, thereby minimizing impacts on the Covered Species to the maximum extent practicable. It is KIUC's intention that either KV-5 or KV-6 be covered by the requested ITP/ITL However, this project will require further environmental review through the Chapter 343 of the HRS.

2.2.2.2.4 Kapaia Power Station Generation Addition

KIUC's present integrated resource plan calls for it to install its next firm-capacity generating unit at the Kapaia Power Station and this project was analyzed in an EIS under Chapter 343, HRS in 1999 (Planning Solutions, Inc., 1999). The plant additions will consist of a single combustion turbine (CT), a heat-recovery unit, a steam turbine, and electrical equipment.[10] The CT and steam turbine will be housed in separate structures. The heat recovery unit will be either a once-through steam generator (OTSG) or a heat-recovery steam generating unit (HRSG). The structure housing the OTSG or the HRSG (whichever is selected) will be the tallest of the proposed buildings; at approximately 70-feet, it will be about the same height as the existing OTSG for Combustion Turbine Unit 1 (CT-1), which stands at 71.5 ft.. The exact height of the exhaust stack that will be used will be determined when the air quality analyses that KIUC is presently conducting have been completed. However, KIUC expects that it will be approximately the same height as the existing stack on the site.

[10] The unit will be a renewable multi-fuel unit with an approximate output of 18MW.

The stack may require FAA compliant lighting. Any additional lighting, if required, will follow current bird-friendly design and operating criteria. The switchyard will require an additional breaker that will be mounted on an existing structure.

The Kapaia Power Station is not located in an area that is known to have a high passage rate by the Covered Species, and KIUC's monitoring of the grounds of the Kapaia Power Station have not revealed any downed birds at the facility since it was constructed. As the proposed addition does not involve structures or lighting that are significantly different from those that already exist, it is unlikely that proposed addition will increase the take of Covered Species. Nevertheless, operation of the proposed addition is included in the proposed HCP and thus is part of the Proposed Action.

2.2.2.2.5 Green Energy Switchyard/Substation

KIUC has entered into a Purchase Power Agreement with Green Energy Hawaii LLC, which proposes to construct and operate a biomass electric generating facility which will burn woodchips from locally grown trees and other agricultural waste products to generate electricity. Occupying a portion of TMK 2-7-001-001, the Green Energy site is located between Kuʻia Stream and Weoweopilau Streams approximately one-quarter mile *mauka* of Kaumualiʻi Highway and just west of Half-Way Bridge. If the biomass project receives all required approvals and is constructed, Green Energy Hawaii LLC will also construct a substation on its site that will allow it to connect to KIUC's existing Kōloa-Fujita transmission line (which passes over the western portion of the Green Energy site).[11] The existing steel poles supporting the Kōloa-Fujita lines are typically 70 feet high; the additional takeoff structure required for the interconnection would be at or below that height. The only outdoor lightning at the site would be for emergency use only and would be provided using shielded fixtures. Although Green Energy Hawaii LLC will construct the substation and interconnection, upon commissioning and approval by KIUC it will then convey those facilities to KIUC which will thereafter operate and maintain them and will be covered activities. Because the proposed new generating facility is located adjacent to an existing transmission line, it will not require new transmission line construction.

Because the substation structure will be small, will require no regular outdoor lighting, and the interconnection will require only a relatively short takeoff structure, these facilities are unlikely to have any significant adverse effects on the Covered Species.

2.2.3 CONSERVATION MEASURES PROPOSED IN THE HCP

KIUC's HCP proposes a number of conservation measures that will minimize and mitigate the potential effect of its facilities and operations. These are designed to achieve a set of biological goals and objectives (see Table 2.2) that were drawn from a number of sources, including the USFWS *Recovery Plan* (USFWS 1983), the related Five-year Workplan, available scientific literature, State conservation strategies, and extensive consultations with USFWS, DLNR, and State Endangered Species Recovery Committee (ESRC) members. Because implementation of these measures has the potential to affect the surrounding environment, their potential impacts are also addressed in this document.

The conservation measures that KIUC has proposed to implement if the HCP is approved and the requested permit is issued are summarized below. Section 2.2.3.1 describes several efforts to minimize and avoid impacts from existing facilities. Section 2.2.3.2 describes measures that it will take to minimize and avoid adverse effects on the Covered Species from future facilities. Section 2.2.3.3 describes measures that it will take to mitigate the effect of its existing and proposed facilities and operations.

[11]The substation would have three transmission breakers, a spare bay for a future distribution bus and transformers, and a control room.

2.2.3.1 Efforts to Minimize & Avoid Impacts of Existing Facilities

2.2.3.1.1 Reconfigure Existing Overhead Electrical Power Lines at Selected Locations

Past studies have identified ten segments of existing power lines that are thought to have a relatively high potential for take of the Covered Species (Ainley et al. 1995, Podolsky et al. 1998). The approximate locations of those segments are shown in Figure 2.5. After evaluating a broad range of line modifications that might reduce (in combination with existing topography/vegetation/ other obstructions) eliminate or reduce the risk of bird strikes, the segments listed in Table 2.3 were identified where reconfiguring existing facilities in a way that would benefit the Covered Species is feasible within the proposed term of the ITP.[12] The list of minimization possibilities does include some that involve placing telecommunications and/or communications line underground because such changes are able to reduce the number of wire layers without requiring the time and financial resources needed for changes to transmission lines. Projects that require undergrounding of 69 kV electrical facilities in order to remove the risk of take require further analysis to determine if the cost is warranted by anticipated benefits. KIUC proposes to conduct that analysis as it prepares the long-term minimization program that it will seek approval for through its application submitted in conjunction with the KSHCP.

Taking into account numerous factors such as engineering design, right-of-way constraints, site-specific circumstances, permitting needs, cost, and likely magnitude of collision risk reduction, KIUC has identified several power line reconfiguration projects it is able to implement during the up to 5-year term of the Short-Term HCP. KIUC estimates the total cost of the line reconfiguration it will implement pursuant to this Short-Term HCP is approximately $6.1 million.

As a result of the plea agreement between KIUC and DOJ that was signed on December 2, 2010, all of the power line reconfiguration projects included in the Proposed Action, except for segments H-3 and H-4 in Table 2.4, will also occur under the No-Action Alternative. The proposed reconfiguration projects, in concert with the line modifications that KIUC has already committed to, addresses nearly all of the power line segments that evaluations conducted during the ongoing preparation of the *Kauaʻi Seabird Habitat Conservation Plan* identified as presenting a "Very High" or "High" potential risk to the Covered Species, except for the lines along Kūhiō Highway, that are expected to be addressed in conjunction with the widening project that the State of Hawaiʻi Department of Transportation is implementing in the Wailua River area) (see Table 2.3).

[12] Typical construction reconfigurations evaluated included various combinations of undergrounding, rearranging overhead wires to reduce the number of layers of wire, and rearranging the wires to decrease their height (with the goal of bringing them down to a height beneath adjacent barriers to bird flight). In addition, KIUC evaluated various types of stream crossings, including attachment to bridges and horizontal direct bore under the rivers. These did not affect the potential for take (all were zero), but it did lead to different costs as attachments are less costly than boring.

Table 2.2 Biological Goals and Objectives of the Short-Term HCP.

Biological Goals	*Conservation Measures*
Goal 1: Minimize the impact of existing and future KIUC facilities on the Covered Species so as to assist in their recovery.	1.A: Continue to minimize KIUC's contribution to light attraction by using only full-cutoff light fixtures on existing and future facilities.
	1.B: Minimize the impact of existing KIUC power lines by avoiding the construction of new lines that would increase take above present levels, and implementing specific modifications to certain power line segments to reduce the potential for take.
	1.C: Ensure that minimization measures at power plants, substations and other facilities are institutionalized (i.e., made part of each facility/department's standard operating procedures).
	1.D: Provide downed seabird and monitoring training to KIUC personnel.
	1.E: Provide sufficient support for SOS to ensure its continued operation for the duration of the ITP/ITL. (Also listed as 2.A.)
Goal 2: Mitigate for unavoidable adverse impacts of KIUC facilities on Covered Species so as to assist in their recovery.	2.A. Ensure the continued operation of the SOS+ Program for the duration of the ITP/ITL.
	2.B: Provide for and ensure the implementation of seabird colony habitat restoration, predator control, and/or other appropriate conservation strategies contributing to the recovery of Covered Species as approved by the agencies, commensurate with the level of take to provide net benefit to the species and environment.
Goal 3: Monitor impact to species, report, and provide for adaptive management so as to ensure that conservation resources provide the greatest possible contribution toward recovery.	3.A: Ensure that monitoring measures at power plants, substations and other facilities are implemented per approved monitoring plan to track performance with respect to the Covered Species.
	3.B: Continue to explore and consider alternative avoidance, minimization, monitoring and mitigation options for improvement, and implement as agreed and appropriate.
	3.C: Provide for and ensure compliance monitoring, including but not limited to underline take monitoring, and review of HCP activities.
	3.D. Fund development and implementation of underline monitoring program.
Goal 4: Assure funding for activities under the HCP so that conservation measures are certain to be implemented.	4.A: Provide funding assurances per HRS 195-D.
Goal 5: Provide information that will inform long-term take authorization following the end of the short-term permit.	5.A: Assist efforts to develop an island-wide HCP on Kaua'i.
	5.B. Fund update of Spear et al.' (1995) at-sea seabird population estimates.
	5.C Fund two-year auditory survey to locate additional seabird breeding colony/habitat opportunities for future mitigation.
Source: Compiled by Planning Solutions, Inc.	

Many of the reconfiguration projects are premised upon the shielding effect of existing vegetation. Such vegetation could be removed or destroyed (e.g., removal by the private landowner over whom KIUC has no control, due to severe storms, etc.), thereby eliminating such shielding effect. The loss of shielding vegetation at the site of the reconfigured lines could increase the risk to the Covered Species.

KIUC will use its best efforts to ensure the continued and ongoing presence of such shielding vegetation through the acquisition of conservation easements or other similar legal instruments from or agreements with the landowners. Within sixty days of a significant loss of such shielding vegetation (e.g., more than 100 linear feet for a reconfigured line segment classified as presenting a very high or high take risk), KIUC will analyze the feasibility of alternative means of eliminating the increased collision risk posed by such loss. Such alternatives could include, but need not be limited to, planting fast-growing replacement vegetation, lowering and/or reconfiguring the power lines in the affected area, undergrounding the power lines in the affected area, and re-routing the power lines in the affected area. KIUC will immediately then present the results of its analysis to, and promptly confer with, the USFWS and DOFAW. KIUC and the Agencies will then work collaboratively to select the most suitable, feasible alternative, which KIUC shall then implement as soon as possible. If the Service, DOFAW and KIUC do not agree on the proposed response the informal dispute resolution process detailed in the IA will be initiated.

2.2.3.1.2 Identify High Risk Streetlights and Implement Additional Feasible Measures

KIUC will regularly evaluate new SOS data provided or made available to it by DOFAW, and any anecdotal information it may receive, to identify any specific individual KIUC streetlights that appear to have caused the downing of more than one seabird within one fallout season. The first such evaluation shall occur within sixty days of the Agencies' approval of the HCP and issuance of the ITP and ITL. Upon identifying any such streetlight(s), KIUC will within sixty days evaluate the feasibility of implementing different streetlight technologies or practices at that location, and then proceed immediately to implement any such feasible technologies or practices that appear likely to reduce effects on the Covered Species. KIUC shall not wait for the completion of the feasibility analysis described in Section 5.5.1 of the HCP to begin implementing this requirement, but once the feasibility analysis is complete KIUC will use the information and conclusions contained in that feasibility analysis in implementing this requirement. Any disagreement between the parties over what modifications are feasible will be addressed via the informal dispute resolution process detailed in the IA.

2.2.3.1.3 Participate with the State DOT in Undergrounding Lines in the Wailua River Area

KIUC has been working with the State Department of Transportation (DOT) for several years in an effort to underground as many lines as possible as part of the State DOT's highway widening project in the Wailua River area. As a result of this effort and of the availability of special funding from the Federal government, it appeared likely that KIUC was going to be able to underground the existing overhead lines between the Lydgate Substation and the Kapaʻa bypass, a distance of approximately 1.7 miles, but the status of that project is now unknown due to litigation over impacts to cultural resources. The effects of this project to the environment are not included in this analysis because it is being implemented regardless of ITP issuance, but are addressed under a separate NEPA process.

2.2.3.2 Measures to Minimize & Avoid Impacts of Future Facilities

Because of the relatively short term of the HCP and ITP, KIUC does not anticipate that future facilities other than those identified in Section 2.2.2 this report will need to be constructed while the HCP and ITP are in effect. Nevertheless, KIUC will support the following specific initiatives that are likely to promote minimization and avoidance in the future.[13]

[13] KIUC has adopted a "Flat Design Standard for New 12 kV Electrical Distribution Lines" that it believes will help minimize the effect of any new facilities that the utility may construct and improve on situations where it is followed during retrofitting or relocation of existing facilities. Prior to the late 1980s, nearly all of the utility's 12-kV distribution lines were constructed using what is referred to as "Flat" or "Cross-arm" design that places the three wires in a circuit at

2.2.3.2.1 Continue to Use Bird-Friendly Outdoor Lighting

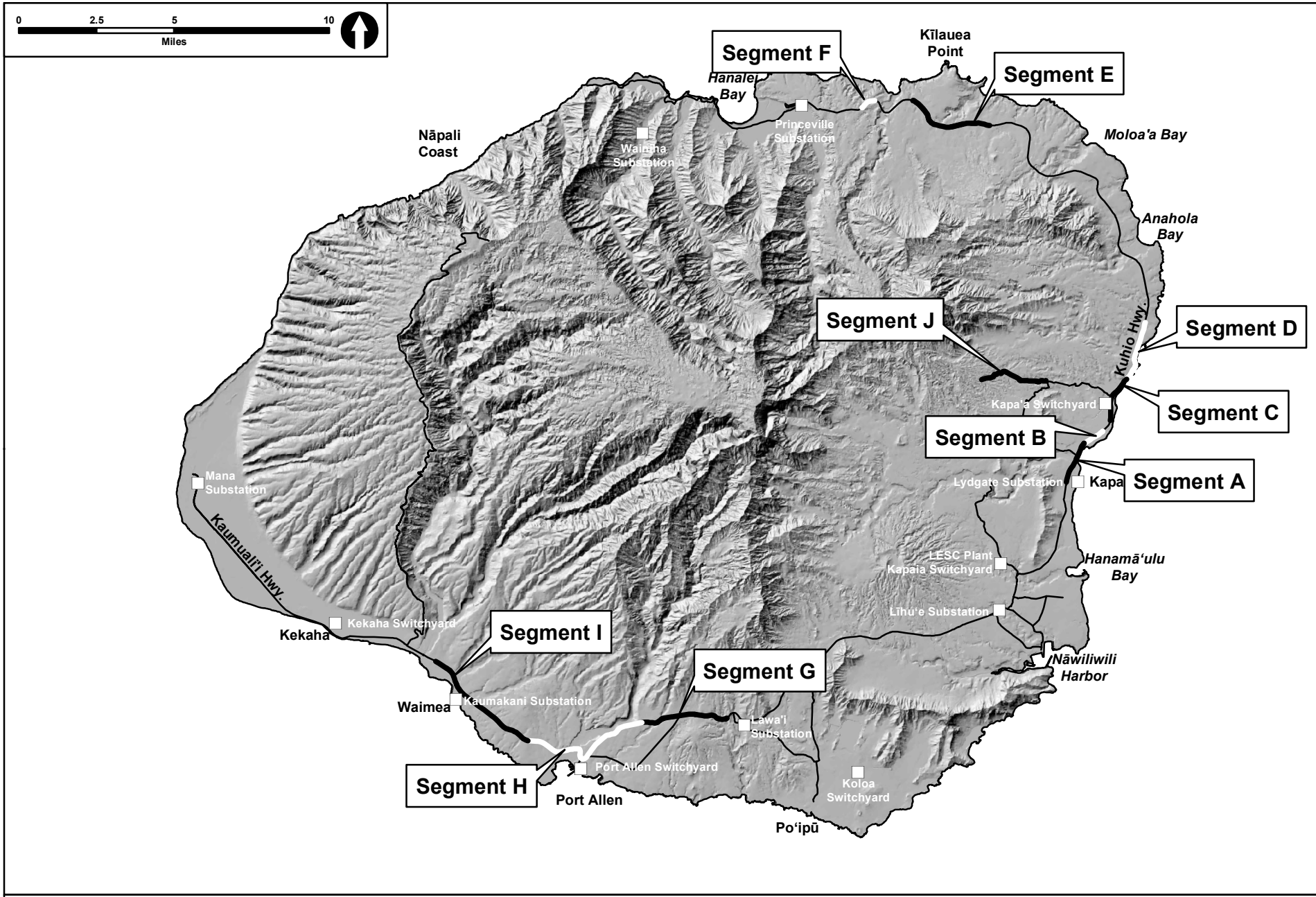
The vast majority of lights owned and operated by KIUC are streetlights. In accordance with its existing practice, all new or replacement streetlights will utilize luminaires with cutoff optics, which do not emit light above an angle of 90 degrees. For all other new or replacement lights, KIUC will only utilize shielded lights.[14]

If new shielding or lighting options that provide greater protection for the Covered Species become available during the term of the HCP, KIUC will evaluate them.[15] Specifically, KIUC will conduct an analysis of the feasibility of utilizing other lighting technologies and practices which might further reduce potential impacts of shielded streetlights on the Covered Species. This analysis will evaluate, at a minimum, LED streetlights that turn on only when needed (e.g., through use of a motion detector or sensor located in the roadway), wireless "smart meter" technology for controlling street lights remotely, seasonal deactivation of streetlights, and the use of colored light bulbs or filters. The analysis will consider cost, logistics, maintenance, public safety, regulatory, legal liability and other appropriate factors. KIUC will submit to the USFWS and DOFAW a report documenting the results of this feasibility analysis within twelve months of the Agencies' approval of this HCP and issuance of the ITP and ITL. For technologies and practices found to be feasible, KIUC will implement such technologies and practices during the normal course of light replacements. Any disagreement between the parties over what modifications are feasible will be addressed via the informal dispute resolution process detailed in the IA.

approximately the same height above the ground. However, in response to public concerns about the possible health effects of electro-magnetic fields (EMF) armless, or "Delta" construction began to gain favor. "Delta" power line configuration involves mounting two conductors on one side of a pole and attaching the third conductor in between them on the opposite side of the pole; this provides equal spacing between all three conductors. While the Delta and Vertical configurations reduce the levels of EMF, they present a greater obstacle to low-flying birds than does the flat design. Accordingly, on October 15, 2007 KIUC formally adopted guidelines that mandate use of flat designs for all newly constructed lines except in special circumstances.

[14] In the unlikely event that KIUC is forced during emergency repairs to use outdoor lights which do not meet these performance standards, KIUC will replace the sub-standard lights with lights that meet the performance standard as soon as possible, but in no event less than twelve months after the emergency repair is completed.

[15] For example, recent tests by Philips in the Netherlands suggest that greenish-tinged lights may produce less glare than orange/yellow or white lights and are well received by the public, boaters, ships in their use at docks. If proven successful from a performance standpoint, such technology could replace Metal halide and some wattages of high pressure sodium (HPS). See, for example *"NAM and Philips help birds migrate safely across North Sea"* (August 24, 2007), http://www.newscenter.philips.com/sites/philipsnews/about/news/news/20070824_Bird_Lighting.page.



Prepared For:	Prepared By:	Source:	Project:	Figure 2.5:
Kauai Island Utility Cooperative	PLANNING SOLUTIONS	-KIUC -State of Hawaii GIS	KIUC Habitat Conservation Plan	**Key Power Line Segments**

Figure D-1 Key Power Line Segments 2011-04-06.mxd

Table 2.3. Line Segment Risk Ranking by KSHCP

Segments	*Total Km.*	*Radar Rank*	*Landscape*	*EPRI Rank*	*SOS Rank*	*EPRI + SOS score*	*EPRI + SOS combo rank***	*Take Risk*
D. Keālia , Hwy 56, mile 9.1 to 11.0	3.04	6	valley	1	1	2	1	Very High
A. Wailua, Hwy 56, mile 5.0 to 5.9 (may overlap with highway widening project)	1.44	2	valley	1	2	3	2	Very High
H. ʻEleʻele/Hanapēpē, Hwy 50, mile 15.0 to 18.0	4.8	11	coastal upland / valley	3	3,11	6	3	High
G. Lawai/Kalaheo, Hwy 50, mile 9.5 to 13, high lines over the valley/town	5.6	12	inland valley / upland	4,2	6,7	8	4	High
C. Kapaʻa, Hwy 56, mile 7.5 to 9.0	2.4	4	coastal lowland	5	4	9	5	High
I. Waimea, Hwy 50, mile 22.0 to 24.0	3.2	9	valley	3	12	15	6	Medium
B. Waipouli, Hwy 56, mile 6.4 to 7.1	1.12	4	coastal lowland	5	12	17	7	Medium
J. Moalepe, Waipouli Rd., west to Olohena Rd. (Kondo Gates), 2.3 miles	3.68	4	inland upland	7	10	17	7	Low
E. Kalihiwai, Hwy 56, mile 21.0 to 23.9 (actually in Kilauea)	4.64	5	coastal upland	8*	9	17	8	Low
F. Princeville, Hwy 56, mile 25.5 to 26.0	0.8	5	coastal upland	8*	9	17	8	Low

Table Notes:

** Take risk based on EPRI and SOS. Where combined score was equal, radar used as proxy measure to identify rank. EPRI rank based on number of dead adult NESH found by PRBO, adjusted for probability of sighting a carcass and survey period (Ainley et al. 1995, Vol.2). The EPRI rank does not account for line changes that were made since 1994 along the driving circuit. SOS rank based on number of dead adult NESH recorded in SOS for years 1979 to 2002. See SOS worksheet for details. Radar reflects only the passage rate and is generally used for assessing population trends; it does not account for how differences in line height, landscape, etc. may affect the risk of collision. Radar rank based on 2006-2008 mean target rates by site (KESRP, unpublished data).

* No dead birds found in EPRI 1994 driving circuit.

Source: Compiled by Planning Solutions, Inc. based on DOFAW KSHCP spreadsheet dated July 26, 2010.

Table 2.4 Proposed Line Reconfiguration: Already Identified Segments

Area	*From*	*To*	*Length*	*Existing Features*	*Total*	*Basis of Choice*
Keālia (Seg.D-1)	Hwy 56 - mile 9.1 Kawaihau Rd	Mailihuna Road	4,600 ft.	Hill and tall trees, some open areas	$721,474	Option D1-4: Converting the distribution to flat construction will reduce the number of layers of conductors and also allow lowering of the transmission circuit into a compact configuration. The hillside and vegetation directly mauka of the highway provides shielding of the remaining facilities.
Keālia Bridge	Keālia Bridge	Keālia Bridge	340 ft.	Keālia Bridge	$187,680	Option D-Bridge-4: Attachment of distribution and communication facilities onto the bridge will allow for the reduction in height of the transmission conductors. Trees on the northern mauka side of the bridge area are at a height of about 50 feet.
Keālia (Seg.D-2)	Mailihuna Road	Ka'ao Road	3,300 ft.	Tall iron trees	$1,939,124	Option D2-2: Undergrounding distribution and communication facilities will keep transmission conductors below tree-top level.
Hanapēpē (H-3)	Port Allen side of Hanapepe River By the shore	Hanapēpē side of Hanapēpē River By the shore	700 ft.	Crossing Water	$157,020	Dual circuit of transmission could be lowered approximately 15 feet, which would leave it no more than 5 feet above vegetation level (except across water). Needs to be assessed for potential risk to fishermen. (H-3)
Hanapēpē (H-4)	Hanapēpē River	Intersection of Lele Rd.	1,800 ft.	Relatively Open Area	$403,766	Lowering the dual 12-kV distribution conductors will place conductors close to surrounding vegetation level.
Hanapēpē (H-7)	Town Bridge	Town Bridge	500 ft.	Crossing River	$216,000	Attaching distribution circuit to bridge will reduce number of wire layers and Potential for take.
Kapaʻa (C-1)	Hwy. 56, mile 7.5	Hwy. 56, mile 8.0	2,640 ft.	Near Town	$158,400	Lowering the lines and changing from vertical to horizontal 12 kV arrangement reduces the collision risk.
Kapaʻa (C-2)	Hwy. 56, Bridge	Hwy. 56, Bridge	130 ft.	Over River	$73,008	Attaching distribution circuit to bridge will reduce number of wire layers and Potential for take.
Total for Already Identified Segments					$3,856,472	

2.2.3.2.2 Promote Bird-Friendly Practices by Its Members/Customers

KIUC will continue its practice of promoting bird-friendly practices by its members. These efforts will include the following:

- KIUC will continue to encourage developers of new commercial and residential developments on Kauaʻi to underground power lines in the areas to be developed. This will reduce impacts on the Covered Species.[16]
- Second, KIUC will encourage the County of Kauaʻi to adopt a new zoning ordinance requiring that all new developments on the island locate all of their utility lines underground.
- Third, KIUC will support efforts to actively pursue alternative sources of funding to mitigate the high cost of undergrounding lines.

In addition, KIUC will make available to others, via its website (www.kiuc.coop) and other means, copies of outdoor lighting design guidelines and model lighting codes. This information is intended to make it easier for other organizations to install and/or switch to outdoor lighting that causes less stray light than would otherwise be the case. It would also facilitate the adoption of County-wide regulations designed to reduce stray light.

[16] An example involves the undergrounding of an existing overhead power line in the greater Poʻipū area as well as the use of underground lines in residential areas that are part of the new Kukuiʻula development.

2.2.3.3 KIUC's Proposed Mitigation Measures

If the HCP is approved and the permits are issued, KIUC will implement the following conservation measures to mitigate the effect of unavoidable take.

2.2.3.3.1 Fully Fund Implementation of the Current SOS+ Manual for the Term of the HCP

The SOS+ Program as provided for in the updated *SOS Manual* increases the conservation benefit to the Covered Species compared to the previous SOS Program. It serves to both minimize the impacts of KIUC facilities (to the extent the program retrieves and successfully releases birds downed as a result of KIUC facilities), and mitigate the unavoidable impacts of KIUC's facilities (to the extent that it retrieves and successfully releases birds downed for reasons unrelated to KIUC facilities). As noted previously, downed seabirds will almost certainly die if not retrieved, treated, and released by the program. Consequently, SOS+ saves literally hundreds of individual Covered Species birds each year.

Consequently, through and for the duration of the HCP, KIUC will annually provide sufficient funds to the Kauaʻi Humane Society (KHS) or another suitable entity approved by DLNR and USFWS for it to fully implement SOS+ in accordance with the current SOS+ Manual.[17] KIUC's annual funding of this (in 2009 dollars) will be as follows:

- $150,000 per year to the Kauaʻi Humane Society to operate the SOS+ Program in accordance with the SOS Manual.
- $25,000 per year spent by KIUC on community outreach, education, and related aspects of the SOS Program as it has done in previous years.
- Up to $25,000 per year on consultant fees in support of the SOS Program.

As indicated in the HCP, KIUC is obligated to carry out the program even if the costs exceed the anticipated amount.

2.2.3.3.2 Fund Seabird Colony Management and Predator Control in Limahuli Valley

In late 2006, a Kauaʻi Endangered Seabird Recovery Project (KESRP)[18] survey team identified the Upper Limahuli Preserve (owned by the private, non-profit National Tropical Botanical Garden (NTBG)) as a site where Covered Species breeding colony management work might be feasible. The survey identified concentrations of Hawaiian petrel and Newell's shearwater calling activity, as well as active burrows and other evidence of breeding activity of both species, in both major valleys within the Upper Limahuli Preserve. The night-vision surveys also documented large numbers of birds traveling south along the Wainiha/Upper Limahuli ridgeline suggesting many birds also travel through Limahuli to access other breeding areas further inland, possibly in Wainiha Valley, Hono O Nā Pali and elsewhere (NTBG 2008).

In 2004, NTBG received a grant from the USFWS to construct an ungulate proof fence around approximately 400-acres of the Upper Limahuli Preserve and while environmental disclosure and permitting processes delayed the start of construction, the fence has now been completed. NTBG also received an additional grant to control alien invasive plant species within the preserve area. The primary objective of NTBG's conservation efforts are to protect listed plants that occur within the Preserve, however, USFWS, DOFAW, NTBG and KIUC all agreed that incorporating specific actions to protect and enhance the populations of Covered Species there and sharing infrastructure and transportation costs, creating a broad, landscape-level conservation effort, will produce greater

[17] As noted in the HCP and in the Manual, the SOS+ Program is to be evaluated each year, and appropriate modifications are to be considered that could improve the program. KIUC's expectation is that any such modifications would reflect adjustments to the current SOS+ Program, rather than significant additions to the overall SOS+ effort and associated costs. However, KIUC also recognizes that the SOS+ Program could expand if other sources of funds become available in the future (e.g., from grants, or from mitigation measures included in other HCPs addressing the Covered Species), in which case the Manual could be revised to reflect such program expansion.

[18] The Kauaʻi Endangered Seabird Recovery Project is a collaborative effort between the University of Hawaiʻi, the USFWS, and DOFAW.

benefits to the Covered Species and other resources than more separate, narrowly focused efforts. In order to avoid impacts to Hawaiian hoary bats, NTBG will not disturb any woody vegetation during the birthing and pupping season (May 15 – August 15). In order to avoid any impacts to nesting seabirds, vegetation will not be cleared in the vicinity of any active burrows.

Now that the ungulate exclusion fence has been completed, the following list of tasks have been identified for implementation over the five-year period covered by the ITP:

- *The development and implementation of a comprehensive ungulate removal and management program.* Pen traps and snares will be used and checked every 24-72 hours. Existing paths will be utilized as much as possible, including streams, to minimize local impact. No trapping will be carried out within 25 meters of known locations of listed plant species. No trapping is to occur within 150 meters of listed bird species at all times of year to avoid damage to habitat.
- *The development and implementation of a feral cat removal and management plan.* Live cage traps, soft jaw traps or conibear (body gripper) traps will be used and checked every 24-48 hours. Trapping will be done along the perimeter of the preserve, and along the central ridge separating the two gullies, using an existing trail system. No trapping will occur near listed plant species. Along these sections near to known breeding sites of the Covered Species, trap placement will be >25 m away from known burrows and will not spatially overlap with birds.
- *Implementation of selective rodent control where practicable, with the long-term hope of implementing an aerial rodenticide program.* Rat control will be performed by NTBG staff and will include activities such as mechanical traps and banding of trees to exclude rats. Due to the ecology of rodent populations, control efforts for them will initially be episodic and local in scope, but might be valley-wide at a future date. Future efforts may involve poisoning of rats with bait stations once funding and any additional regulatory clearances are obtained for this activity.
- *Development and implementation of an active alien plant control and monitoring program.* Alien trees and shrubs will be selectively removed from strategic locations. Incipient invaders (i.e., those that still exist in small numbers and have yet to become well established) will be an important focus of the alien plant control program. The basic methodology for this will be the use of a chain saw and/or the use of translocated herbicide that is either painted on the stump, or injected into the trees or shrubs. Alien herbaceous species will be controlled in order to prepare sites for replanting with native species and as needed to maintain selected areas in the future. Herbicides may also be used to prevent the spread of localized incipient invasions of herbaceous species, and then only when this technique has a high probability of controlling the target species. Mechanical control methods will be used preferentially over herbicides. When herbicides are necessary, they will be applied in accordance with label instructions. Herbicides will be applied at the minimum volume and concentration required for control of the target species and will be applied only during periods of dry weather and never when heavy rains are expected.
- *Development and implementation of a Covered Species monitoring program.* The effects of all of the management actions implemented to benefit Covered Species will be assessed by monitoring burrows either visually or by using camera equipment, trapping birds either by hand, nets, or traps, and banding birds with individually-numbered leg bands. Individual birds will not be handled more that once per season, and each handling event will require handling the bird for approximately 5 to 7 minutes. All monitoring activities will be conducted by qualified biologists.
- These types of activities will also require the development and maintenance of a number of on-ground structures and infrastructure to support field crew activities, including:
- *Development and maintenance of helicopter landing zones.* These landing sites require the trimming of woody vegetation in a 15 foot diameter area for loading and unloading. Any tall trees must also be trimmed in a 30 foot diameter in order to provide clearance for the helicopter rotors. Level ridge top areas with low shrub canopy will be selected for landing zone development to

reduce or eliminate the need to clear large trees or perform manual grading of the areas surrounding them.

- *Sighting and construction of a minimum of two weatherproof living structures*. Up to four small (approximately 10x20 feet) tool storage/shelter structures for NTBG staff and/or research scientists are proposed. The exact size and location of these facilities will be determined when the NTBG is prepared to construct them, but each facility will not exceed 400 square feet and will be sited to avoid impacts to native vegetation.
- These efforts will result in significant beneficial impacts not only to at least two and possibly all three of the Covered Species addressed in the HCP, but also to numerous listed and/or rare native plant species as well as the ecosystem as a whole.

For each year that the ITP would be in effect, KIUC will fund the implementation of these tasks within the upper Limahuli Valley as shown in Table 2.5, and commits to funding the specific tasks used to calculate the implementation budgets, even if the actual cost of the specific tasks turns out to be different.

2.2.3.3.3 Conduct Seabird Colony Management & Predator Control at The Hono O Nā Pali NAR

In 2010, DOFAW identified an additional Covered Species breeding colony as being suitable for the implementation of predator control efforts and KIUC proposed to fund colony management and predator control activities as part of their Short-term HCP. That site is located with the Hono O Nā Pali Natural Area Reserve, in northwestern Kauaʻi, west of the Limahuli Valley. DOFAW researchers have determined that Hono O Nā Pali NAR is an important breeding site for both the Newell's shearwater and the Hawaiian petrel. Predation of the Covered Species by cats has been documented over several years in an area close to high human use (Pihea Vista), and it is likely that predation from cats, rats and owls is an important limiting factor to Covered Species breeding success in this area.

The 3,580-acre Hono O Nā Pali Natural Area Reserve stretches from sea level on the Nā Pali coast to Pihea (4,284 feet), crossing the Kalalau Trail approximately 2.5 miles from the trail head at Hāʻena State Park. The Reserve, whose southern boundary is the south side of the Alakaʻi Swamp Trail, encompasses parts of Hānākapiʻai and Hanakoa streams and all of Waiahuakua Stream. Its Reserve's cliffs and valleys along the Nā Pali coast contain many rare plant species. Feral goats have been identified as the major threat to the native ecosystem at lower elevations, including the Waiahuakua and Kawelu Cliffs units. Much of the native habitat in these areas has been severely degraded by goat foraging and activity, and DOFAW has made protecting intact habitat a high priority. In particular, weed management is a priority, especially for Clidemia (*Clidemia hirta*), blackberry (*Rubus argutus*), firebush (*Morella faya*), and banana poka (*Passiflora tarminiana*).

Table 2.5 Total Limahuli Preserve Budget

ITEM	2010	2011	2012	2013	2014	TOTAL
BASIC Helicopter requirements	$17,820	$41,820	$41,820	$41,820	$41,820	$185,100
PROJECT management labor costs	$12,000	$12,000	$12,000	$12,000	$12,000	$60,000
INFRASTRUCTURE						
Fence maintenance - ongoing	$20,000	$20,000	$20,000	$20,000	$20,000	$100,000
Remote landing zone improve. & construction	$9,000	$5,500	$1,000	$1,000	$1,000	$17,500
Upper Limahuli Base camp improvement	$11,900	$1,100	$1,100	$1,100	$1,100	$16,300
Upper Limahuli Remote camp construction	$8,600	$1,100	$1,100	$1,100	$1,100	$13,000
VHF Radio Repeater station	$16,000	$0	$0	$0	$0	$16,000
Infrastructure Subtotal	**$65,500**	**$27,700**	**$23,200**	**$23,200**	**$23,200**	**$162,800**
ALIEN VERTEBRATE CONTROL						
Equipment	$17,450	$13,604	$13,825	$14,200	$13,825	$72,904
Labor	$2,000	$43,800	$51,000	$51,000	$51,000	$198,800
Alien Vertebrate Control Subtotal	**$19,450**	**$57,404**	**$64,825**	**$65,200**	**$64,825**	**$271,704**
ALIEN PLANT CONTROL						
Equipment	$1,282	$915	$1,082	$915	$1,032	$5,225
Labor	$11,000	$11,000	$11,000	$11,000	$11,000	$55,000
Helicopter over-flight surveys	$0	$2,240	$0	$2,240	$0	$4,480
Alien Plant Control Subtotal	$12,282	$14,155	$12,082	$14,155	$12,032	$64,705
BIRD MONITORING						
Labor	$19,800	$28,300	$29,800	$29,800	$29,800	$137,500
Bird monitoring equipment	$15,550	$5,650	$5,650	$8,050	$5,650	$40,550
Social attraction & chick translocation equip.	$4,500	$5,750	$4,250	$4,250	$250	$19,000
GIS mapping	$0	$3,620	$0	$3,620	$0	$7,240
Additional Helo reqmts. for slings or pax	$6,720	$6,720	$6,720	$6,720	$6,720	$33,600
Bird Monitoring Subtotal	$46,570	$50,040	$46,420	$52,440	$42,420	$237,890
NATURAL DISASTER RECOVERY RESERVE	$10,000	$10,000	$10,000	$10,000	$10,000	$50,000
INDIRECT COSTS (at 24% of direct costs)	$44,069	$51,148	$50,483	$52,515	$49,511	$247,728
GRAND TOTAL	**$227,691**	**$264,267**	**$260,830**	**$271,330**	**$255,808**	**$1,279,927**
Note: All amounts are in 2010 U.S. dollars; actual funding amounts for years 2011-2014 will be adjusted for inflation using agreed-upon indices.						
Source: KESRP and NTBG – July 15, 2009 spreadsheet.						

In order to avoid impacts to Hawaiian hoary bats during the construction of future activities and facilities, DOFAW will not disturb any woody vegetation during the birthing and pupping season (May 15 – August 15). In order to avoid any impacts to nesting seabirds, vegetation will not be cleared in the vicinity of any active burrows.

This site is part of the Kauaʻi Watershed Alliance, a partnership of eleven public and private entities (including DLNR) encompassing 144,044 acres of land. Ongoing and planned management at Hono O Nā Pali includes habitat restoration via invasive plant control and ungulate removal, two actions vital to endangered seabird recovery. In the long term, the Alliance intends to install exclusion fencing for ungulate control and perform extensive monitoring, and DOFAW anticipates some of that longer term work will be accomplished and/or funded through the KSHCP. In the short-term, however, DOFAW has determined that several predator control measures likely to improve Covered Species breeding success can be implemented more immediately. These include: (1) cat-trapping at specific high-traffic sites located near known breeding colonies; (2) rat-baiting near known breeding colonies; (3) owl removal; and (4) breeding success monitoring to determine the efficacy of, and identify potential improvements in, these management actions.

KIUC and DOFAW anticipate that the work will be performed by DOFAW Natural Area Reserve staff and Kauaʻi Endangered Seabird Recovery Project staff, or another qualified entity approved by USFWS, DOFAW and KIUC, utilizing funds provided by KIUC. KIUC will provide the funds for such work as detailed in Table 2.6, and commits to funding the specific tasks used to calculate the implementation budgets, even if the actual cost of the specific tasks turns out to be different.

Table 2.6. Hono O Nā Pali Predator Control Annual Costs

Item		Year 1	Year 2	Year 3	Year 4	Year 5	Total
Salaries and Fringe	1 x 100% FTE DOFAW NAR Tech II	$65,000	$65,000	$65,000	$65,000	$65,000	$325,000
	2 x 25% FTE DOFAW NAR Tech I	$25,000	$25,000	$25,000	$25,000	$25,000	$125,000
	2 x 10% FTE KESRP Tech	$15,000	$15,000	$15,000	$15,000	$15,000	$75,000
Equipment & supplies	Vehicle (4-wheel drive)	$40,000	0	0	0	0	$40,000
	Traps (100)	$5,000	0	0	0	0	$5,000
	Bait, ammunition, misc	$1,000	$1,000	$1,000	$1,000	$1,000	$5,000
	Remote Cameras (10)	$5,000	0	0	0	0	$5,000
	Firearms (1 pistol, 1 22 rifle)	$1,500	0	0	0	0	$1,500
	Firearms locker	$3,000	0	0	0	0	$3,000
	Fuel	$4,000	$4,000	$4,000	$4,000	$4,000	$20,000
	Field equipment	$2,000	0	0	0	0	$2,000
	Sling load to get traps in	$2,000	0	0	0	0	$2,000
	Helicopter time	$5,000	$5,000	$5,000	$5,000	$5,000	$25,000
	Laptop computer	$3,000	0	0	0	0	$3,000
Staff Training	Contribution to helo, pesticide applicators, firearms, other training	$500	0	0	0	0	$500
	TOTAL	***$177,000***	***$115,000***	***$115,000***	***$115,000***	***$115,000***	***$637,000***
Source: DOFAW Personal Communication to KIUC on August 10, 2010.							

2.2.3.3.4 Fund Update of At-Sea Seabird Population Estimates

There have been no estimates of at-sea seabird populations since those prepared by Spear et al. in 1995. The absence of current population estimates of the Covered Species make it difficult to assess the effects of KIUC facilities and operations on such populations. Consequently, KIUC will fund the actual cost for a one-time analysis of the most recent National Oceanic and Atmospheric Administration (NOAA) research vessel data to update the Spear et al. (1995) population estimates for Newell's shearwater and Hawaiian petrel for the eastern and central tropical Pacific waters of the Hawaiian Archipelago and to relate population density to environmental parameters. The study will analyze the already-collected NOAA at-sea data and provide information about the species' populations and trends.

2.2.3.3.5 Fund Auditory Survey to Locate Additional Seabird Breeding Colonies

KIUC will provide the actual cost (estimated to be $98,000 per year) to support a two-year auditory survey to be implemented by DOFAW, or another qualified entity approved by the agencies (see Table 2.7). The purpose of this study is to locate additional seabird breeding colonies where habitat management work could be performed in the future. The surveys would be conducted in Nā Pali, Hono o Nā Pali, Mānoa Valley (adjacent to the Upper Limahuli Preserve), Lumahaʻi, Hanalei, Makaleha, Wainiha Pali, and Waiʻaleʻale.

Table 2.7. Estimated Annual Cost for Surveys for Additional Seabird Colonies.

Budget Item	*Amount*
Helicopter Time, 15 hours	$15,000
Labor, 3 staff per trip, $5000 per trip, 9 trips total	$45,000
GIS etc	$10,000
Biological Principal Investigator, Writing	$8,000
Biological Coordinator, Coordinating & Writing	$8,700
Administrative Cost (@3%)	$2,601
Subtotal:	$89,301
Contingency (@10%)	$8,930
GRAND TOTAL	$98,231
Source: Mitigation Worksheet from "KIUC Mitigation Funds DRAFT 13DEC2008.	

2.2.3.3.6 Fund Development and Implementation of Appropriate Underline Monitoring Program

In order to increase the amount and quality of data that are available concerning seabirds that may be affected by KIUC facilities, KIUC will cooperate with DOFAW in its development of an underline monitoring program. The monitoring will consist of ground surveys and/or other methods, possibly carried out in conjunction with concurrent radar observations conducted in the vicinity of an agreed-upon subset of KIUC's power lines. The purpose of the surveys is to help quantify the seabird collisions with such power lines, although other objectives may be accomplished as well. KIUC will provide funds to DOFAW, or another qualified entity approved by the agencies, to offset the cost of such monitoring at a cost not to exceed $180,000 per year. A proposed budget is included in the HCP.

2.2.3.3.7 Potential Additional Conservation Actions in Years 4 and 5

If the ITP is issued, and if, on the second anniversary after issuance, KIUC, DOFAW and USFWS agree that take authorization will likely need to remain in effect beyond three years, KIUC will meet with the agencies and evaluate, based on new information generated through the implementation of the mitigation measures described above, what additional measures should be implemented in Years 4 and 5. Such additional mitigation measures are likely to include performing a population viability analysis for the Covered Species, particularly Newell's shearwater, conducting radar surveys of the Covered Species, conducting habitat management activities in the Wainiha Valley or other suitable

location, etc. Because the costs to conduct such equivalent habitat management within Wainiha Valley (or any other site) cannot currently be estimated due to the absence of necessary site-specific information, KIUC will provide up to $271,000 annually for the habitat management based on the assumption that costs for equivalent work will not be higher than the most costly year of the estimated costs of habitat management in Upper Limahuli Valley. Potential impacts from such actions, e.g., invasive species control, vehicle use, etc., are not anticipated to be different from the actions implemented in Limahuli Valley or Hono O Nā Pali. Once the mitigation actions are identified, if any additional impacts are expected, a supplemental NEPA analysis will be prepared and ITP amendment, if necessary, prior to implementation.

2.2.4 SCREENING, ANALYSIS AND POTENTIAL HCP AMENDMENT PROCESS FOR OTHER FUTURE ADDITIONAL FACILITIES

In addition, should DOFAW not have sufficient funding in its budget to continue its annual radar monitoring efforts, KIUC will provide $80,000 to the agency in Year 4 so that it can conduct single night radar surveys at each of the 13 sites that provide historical reference in data analyses and (ii) perform inter-nightly radar at 10 sites in 4 night survey efforts. At DOFAW's discretion, DOFAW may elect instead to have KIUC apply all or a portion of such funds to the Wainiha Valley work described above in order to supplement the $271,000 already dedicated to the Wainiha Valley work.

For future additional facilities that do not fall into one of the two categories described above, KIUC will prepare an internal analysis of whether the construction and operation of the facility will cause take of the Covered Species.

If KIUC concludes that no take will occur, then no incidental take authorization is required and KIUC may construct the facility without seeking an amendment to the HCP or the incidental take permits. In that case, the construction and operation of this new facility will not be covered under the incidental take permits. At its discretion, KIUC may seek USFWS and DLNR concurrence with its conclusion that no take will occur. KIUC may also elect to seek an amendment to the HCP and the incidental take permits to cover the new facility notwithstanding its conclusion that no take will occur.

If KIUC concludes that take of the Covered Species may or is likely to occur, it will employ its best efforts to design the new facility so as to minimize the potential impact on the Covered Species to the maximum extent practicable, utilizing the design standards described in Chapter 5 of the HCP. For a new power line, for example, this could involve adjusting the line route, height, or configuration, and incorporating bird collision avoidance features such as line markers or tall vegetation. KIUC will then present to the USFWS and DLNR a detailed written description of the new facility and such minimization measures, and an assessment of the likely impact of the new facility on the Covered Species. The USFWS and DLNR will then review this submittal, and within 60 days shall inform KIUC in writing that either KIUC has in fact minimized the impact to the maximum extent practicable, or identify for KIUC in writing specific ways in which the impacts can practicably be minimized further. Within an additional 30 days, the USFWS and DLNR shall then determine in writing whether the project (either as originally proposed by KIUC, or as modified with additional impact minimization measures agreed to by KIUC, USFWS and DLNR) is likely to have a minor impact on the Covered Species or a significant or potentially significant impact on the Covered Species.

Incidental take coverage for facilities determined to have a minor impact can be provided through a Minor Amendment to the HCP and incidental take permits. Incidental take coverage for facilities determined to have a significant or potentially significant impact on the Covered Species can be provided through a Major Amendment to the HCP and incidental take permits. Either form of amendment may require additional mitigation commensurate with the degree of additional impact.

2.3 ALTERNATIVE PERMIT TERM

Like the Proposed Action, the Alternative Permit Term Alternative also includes the issuance of an ITP to provide incidental take authorization for operation and maintenance of all existing KIUC facilities, and the installation, operation and maintenance of certain future KIUC facilities. The term of the ITP under this alternative, however, would be limited to 3 years, rather than being automatically extendable to 5 years as is the case under the Proposed Action. This reduced permit term alternative emphasizes the interim nature of the proposed HCP and would require KIUC to either obtain long-term coverage through participation in the KSHCP by the end of the 3-year ITP, or if the KSHCP is not approved by then, KIUC would need to obtain coverage under their own individual long-term HCP or request a major amendment to extend the short-term HCP.

While the intent of the island-wide KSCHP effort is to provide a comprehensive solution to multiple applicants, analyses being done during its development, including a Population Model and Habitat Quality Assessment, should provide KIUC sufficient information to develop their own long-term HCP that adequately addresses their impacts should that be necessary. The anticipated schedule for processing the KSHCP has the public review period being completed by the end of 2011. Therefore, KIUC will be able to determine whether take coverage will be available to them under that HCP with sufficient time to develop an independent long-term HCP, if necessary, within 3 years of ITP issuance.

2.4 ALTERNATIVES CONSIDERED BUT NOT ANALYZED IN DETAIL

2.4.1 MODIFY ALL EXISTING KIUC FACILITIES TO ELIMINATE TAKE

This alternative would require the demolition of all of KIUC's above-ground electrical transmission and distribution lines (which could be accomplished by undergrounding them), demolition of any of its existing electrical generating units that are likely to cause take of Covered Species and abandoning all of the street lights that it presently operates for the County of Kauaʻi. The time it would take to implement this action would be longer than the term of the proposed ITP and take of Covered Species would continue until this alternative was fully implemented.

Undergrounding existing power lines is constrained by KIUC's financial resources and the cost of undergrounding on Kauaʻi. KIUC has a ratepayer base of approximately 29,800 customers, and KIUC has among the highest electricity rates in the nation (about 30 cents per kilowatt hour). KIUC estimates the cost of undergrounding existing above-ground power lines on Kauaʻi to be $3,000,000 to $5,300,000 per mile for standard transmission lines, $4,300,000 to $7,900,000 per mile for standard transmission lines plus one circuit of distribution, and $5,400,000 to $8,700,000 per mile for standard transmission lines plus two circuits of distribution. The average estimates for undergrounding just distribution lines are $2,600,000 per mile for one circuit, and $3,400,000 per mile for two circuits. KIUC recently completed an analysis of a more complex project for the Lydgate Substation to Kapaʻa Bypass Road undergrounding and the 2010 cost estimate for that project was $11,500,000 per mile.

As a result, KIUC states that it is not financially feasible to underground any significant amount of its existing lines within the term of the proposed HCP except in situations where road realignments or other factors make sizeable cost-sharing possible.[19]

[19] KIUC funded the acquisition of Kauai Electric assets with financing provided by the U.S. Department of Agriculture, Rural Utilities Services (RUS), and the National Rural Utilities Cooperative Finance Corporation (CFC). Under the terms of its financing, KIUC must steadily increase its equity and retire its debt by prescribed amounts each year; after satisfying that obligation, KIUC may return certain amounts of patronage capital (e.g., excess of revenue over expenses) to its 29,800 members. KIUC's equity was approximately 14% as of mid-2007, which is consistent with its Equity Management Plan target. KIUC must achieve at least a 20% equity ratio in order to seek additional financing for necessary capital improvements, qualify for reduced interest rates on such additional financing, and gain greater flexibility in its ability to distribute patronage capital. KIUC must also continually achieve other financial requirements imposed by

2.4.2 FACILITY MODIFICATION ONLY

KIUC's proposed HCP splits resources between facility modification, research, and mitigation via colony management and continued support for the SOS Program. This alternative would direct all resources towards changing facilities so as to reduce take. No funds would be allocated to research, to the SOS Program, or to other mitigation measures (other than continued use of shielded street and facility lights). Over time, this alternative is likely to do the most to reduce the potential for birds to collide with KIUC facilities. However, because this alternative does not include efforts to mitigate the ongoing take that would still occur until all facilities were modified to avoid impacts, it would not meet USFWS permit issuance criteria. Therefore, this alternative is not considered practicable and is not assessed in the report.

2.4.3 BREEDING COLONY MANAGEMENT-ONLY ALTERNATIVE

The HCP proposes a comprehensive conservation program designed to avoid and minimize impacts to the Covered Species, and to mitigate unavoidable impacts. With respect to mitigation, KIUC, the USFWS and DOFAW considered extensively the possibility of instituting colony management that includes a predator control program at one or more Covered Species breeding colonies. The best available scientific information indicates that the largest threat to the Covered Species is predation by invasive species, such as rats, cats and pigs, and by habitat change brought about by invasive plant species. The USFWS, DOFAW, and KIUC initially believed that seabird breeding success could be substantially improved by instituting predator control measures and/or habitat enhancement measures at one or more existing breeding colonies, and that the mitigation measures in the HCP should focus almost exclusively on breeding colony management. Such measures could include fencing, trapping of mammalian predators, poisoning of rats, eradication of non-native vegetation and other similar means.

During the course of preparing the HCP, KIUC conducted field assessments at five different breeding colony sites on Kauaʻi. These sites were selected in consultation with the USFWS and DOFAW as having the highest potential for success. After extensive field work, however, it was determined that predator control and/or habitat enhancement work could not be implemented effectively at any of these locations for one or more of the following reasons: the Covered Species appeared to no longer breed there; predator control work was not possible due to physical constraints (remote locations, lack of access, severe terrain); and on-the-ground predator control or habitat enhancement work using accepted and approved techniques was likely to result in more harm than benefit to the Covered Species (e.g., by creating new trails into colonies which could then be used by mammalian predators). Both USFWS and DOFAW reached the same conclusion through extensive additional field research by DOFAW and deliberations by the inter-agency Newell's shearwater Working Group.

Collectively, KIUC and the agencies have determined that the Lehua Island (VanderWerf, et al. 2007), Upper Limahuli Preserve, and most recently, Hono O Nā Pali colony management projects (which are included as mitigation measures in the HCP) are the only currently viable predator control projects that will benefit the Covered Species. Given the challenges inherent in those projects, and the uncertainty regarding their ultimate success, they cannot serve as the sole or primary mitigation in the HCP. Instead, they are included with the SOS Program.

2.4.4 LONGER-TERM/KIUC-ONLY HCP AND INCIDENTAL TAKE PERMIT

The proposed short-term HCP was prepared at the request of the USFWS and DLNR/DOFAW after those agencies reviewed the long-term HCP and ITP/ITL applications that KIUC submitted in October 2007. The agencies concluded that because the level of take of Covered Species due to KIUC facilities can only be estimated with a rough approximation that requires many untestable

its lenders, and maintain sufficient cash reserves to provide adequate day-to-day working capital and provide for unforeseen events such as a hurricane.

assumptions, the benefits of proposed mitigation actions were yet to be determined, and mitigation opportunities remain limited, additional information was needed before determining the effect of a long-term take authorization. The agencies also recommended that a short-term HCP would allow the opportunity to provide benefit to the species through implementation of mitigation and recovery actions that would not otherwise occur, and gather the additional information needed for long term management, which could then be done as an integrated plan that includes all other entities on the island causing light-related take of Covered Species. Therefore, the agencies recommended that KIUC's long-term permit coverage for the Covered Species be addressed through the Kauaʻi Seabird Habitat Conservation Plan and related permits.

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3.0 ENVIRONMENTAL SETTING

3.1 INTRODUCTION

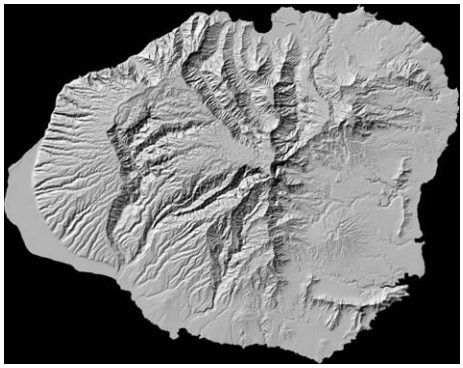
This chapter provides an overview of the existing environment on Kauaʻi. While the breadth of KIUC's system means that the discussion is necessarily islandwide, the discussion below pays special attention to the relationship between KIUC's facilities, known seabird colonies, and the routes that the Covered Species are believed to fly while traveling between nesting areas and the ocean. It is divided into three main parts:

- Section 3.2 discusses the physical environment, including physiography, geology, soils, hydrology, climate, and air quality.
- Section 3.3 covers the overall biological environment.
- Section 3.4 provides an overview of Kauaʻi's socio-economic environment and land use.

3.2 PHYSICAL ENVIRONMENT

3.2.1 PHYSIOGRAPHY, GEOLOGY AND SOILS

3.2.1.1 Physiography



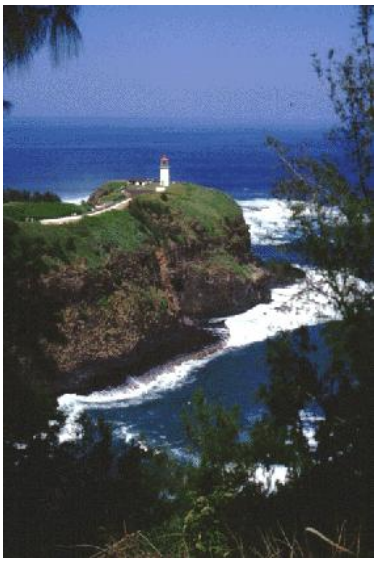
Kauaʻi has a land area of slightly more than 550 square miles. Roughly circular in shape, its most striking physiographic features are a high central plateau topping out at over 5,000 feet at the summits of Waiʻaleʻale (5,148 feet) and Kawaikini (5,243 feet), steep cliffs and deeply incised valleys along the northern Nāpali coast, the 3,600-foot deep Waimea Canyon, the broad Līhuʻe Basin on the southeastern quadrant of the island, and extensive coastal plains. These can be seen on the shaded relief map to the left.

As evidenced by these pictures of Honopū and Hoʻolulu Valleys, the Nāpali coast, on the northwest coast of Kauaʻi, consists of huge cliffs, knife-edge ridges, and deep canyons.

The Waimea Canyon, was formed as the Waimea River cut deeply into lavas of the Waimea Canyon Basalt. As can be seen in the photo to the left, it is a wilderness of deep gorges and labyrinthine canyons. The Waimea River and its tributaries are fed by vast swamps in the very wet plateau of the central highlands. The picture to the left is a view looking up the canyon (i.e., northward), from its western rim.

The west side of Kauaʻi, south of the Nāpali coast has a shape that is typical of shield volcanoes. It consists of a gently sloping surface, cut by a series of deep canyons. The land meets the ocean with either abrupt steep shoreline cliffs or, as in the Polihale area, miles of sandy beaches. The broad, flat Mānā Plain is located on the southwest corner of the Island. It is just above (and in a few areas slightly below) sea level. Another feature of the west side is a 15 to 80-foot high cliff at the interface between the lava that forms the mountains and the Mānā Plain.

The North Coast of Kauaʻi consists of two distinct parts. The portion from Kalihiwai to Wailua consists of a reasonably broad, gently sloping *makai* (seaward) portion backed by the steeper slopes of the Waiʻaleʻale massif. These can be seen in this view of the central highlands of Kauaʻi and Waiʻaleʻale from a point near the shoreline. The portion from Kalihiwai to Hāʻena, where the Nāpali coast begins, is composed of three deeply incised valleys (Hanalei, Lumahaʻi, and Wainiha).

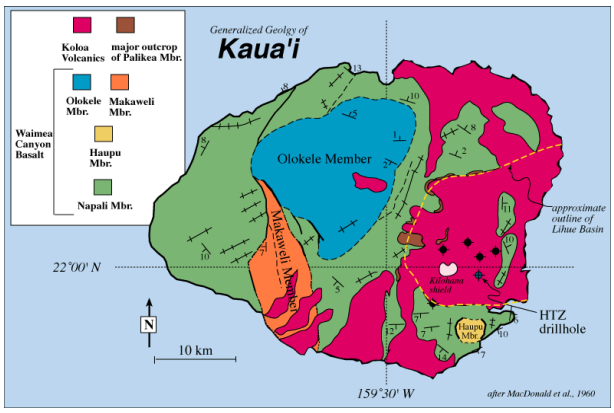


The character of the shoreline varies greatly along this side of the island. It ranges from sandy beaches (as at Hanalei) to rocky sea cliffs. The view of the shoreline adjacent to the historic lighthouse at Lae O Kīlauea near the Kīlauea Point National Wildlife Refuge (shown in the photo to the left) is a good example of the latter.

3.2.1.2 Geology

Kauaʻi, like the other Hawaiian Islands, was formed by magma that emerged from a hotspot on the earth's crust. As this magma moved towards the surface, it erupted as lava, pouring out over the ocean floor. Over time, the eruptions formed a typical Hawaiian shield volcano. It was long thought that the island was formed by a single shield volcano, but more recent investigations suggest that it almost certainly represents two or more.

Figure 3.1 Generalized Geology of Kauaʻi.



The main mass of Kauaʻi is believed to be about 3 to 5 million years old, although there were a few very small eruptions on the island as late as about 400,000 years ago. As shown in Figure 3.1, two basic rock units are found in the stratigraphy. The oldest is the Makaweli member of the Waimea Series lavas and is shown in green (Clague & Dalrymple, 1988). The Olokele Member of the Waimea Series (shown in blue) occupies a large area in the center of the island. The Waimea Canyon scarp probably represents a major collapse at the beginning of the post-shield (or declining) stage. Post-shield-building volcanic soils of the Olokele Member of the Waimea Canyon Basalt may have in filled a major caldera-like collapse structure to form the present day broad summit area of Mt. Waiʻaleʻale and the Alakaʻi Swamp. The Makaweli series volcanics fill a graben-like feature in the southern part of the island.[20] The major east-west trending Hāʻupu Mountain ridge, between Poʻipū and Līhuʻe, is composed of the Hāʻupu Member of the Waimea Canyon Basalt. This is thought to be a structural remnant of the original shield-building and/or post-shield volcanic stage of the island.

After a long period (probably about 0.5 to 1.5 million years) of no eruptions and great erosion of the Waimea Series lavas, eruptions began again. Lavas from this second period of great eruptive activity formed the Kōloa series volcanics. These are shown in red on the map. This post-erosional stage of volcanism on Kauaʻi is particularly well-developed, especially on the eastern side of the island. Very late stage explosive volcanic vents and cones of the Kōloa Volcanics such as Kilohana Crater, Kīlauea Crater, and 35 to 40 other smaller but similar features are present throughout the eastern portion of the island. The very steep eastern facing scarp of Waiʻaleʻale was formed in part by the collapse of the Līhuʻe Basin.

3.2.1.3 Soils

A generalized map showing the main soil associations on the Island of Kauaʻi is reproduced in Figure 3.2. A soil association is a landscape that has a distinctive proportional pattern of soils. It normally consists of one or more major soils and at least one minor soil, and it is named for the major soils. The soils in one association may occur in another, but in a different pattern. Table 3.1 contains brief descriptions of the soil associations on Kauaʻi.

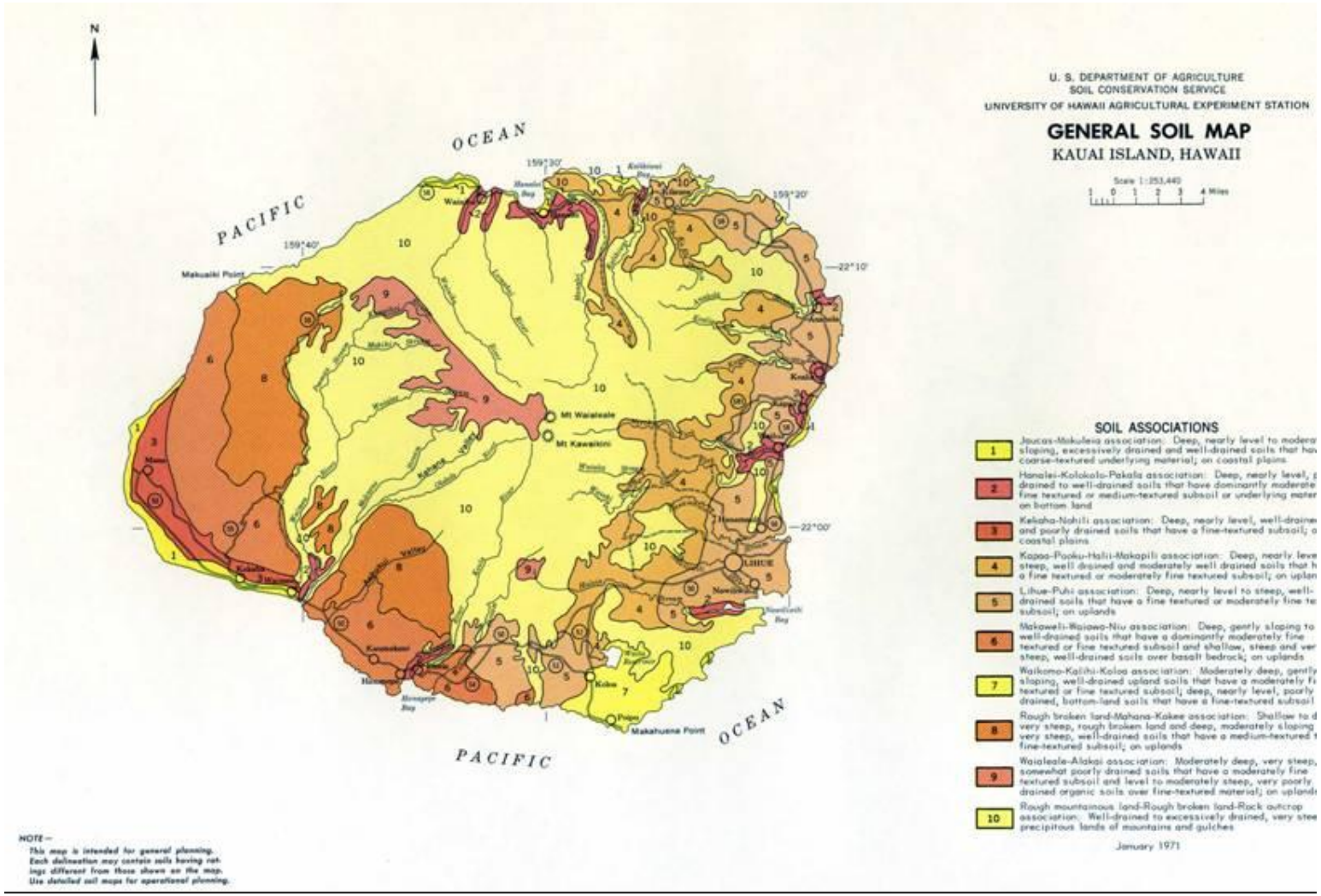
[20] A graben is an elongate block of the earth's crust that is relatively depressed (i.e., that has dropped down) between two fault systems.

Table 3.1. Soil Associations on the Island of Kauaʻi.

Association	Characteristics
Jaucas-Mokulēʻia	Deep, nearly level to moderately sloping, excessively drained and well-drained soils that have coarse-textured underlying material; on coastal plains.
Hanalei-Kolokolo-Pākalā	Deep, nearly level, poorly drained to well-drained soils that have dominantly moderately fine textured or medium-textured subsoil or underlying material; on bottom land.
Kekaha-Nohili	Deep, nearly level, weld-drained and poorly drained soils that have a fine-textured subsoil; on coastal plains.
Kapaʻa-Poʻokū-Hāliʻi-Makapili	Deep, nearly level to steep, well drained and moderately well drained soils that have a fine textured or moderately fine textured subsoil; on upland.
Līhuʻe-Puhi	Deep, nearly level to steep, well-drained soils that have a fine textured or moderately fine textured subsoil; on uplands.
Makaweli-Waiawa-Niu	Deep, gently sloping to steep, well-drained soils that have a dominantly moderately fine textured or fine textured subsoil and shallow, steep and very steep, well-drained soils over basalt bedrock; on uplands.
Waikomo-Kalihi-Kōloa	Moderately deep, gently sloping, well-drained upland soils that have a moderately fine textured or fine textured subsoil; deep, nearly level, poorly drained, bottom-land soils that have a fine-textured subsoil.
Rough broken land-Mahana-Kōkeʻe	Shallow to deep, very steep, rough broken land and deep, moderately sloping to very steep, well-drained soils that have a medium-textured to fine-textured subsoil.
Waiʻaleʻale-Alakaʻi	Moderately deep, very steep, somewhat poorly drained soils that have a moderately fine textured subsoil and level to moderately steep, very poorly drained organic soils over fine-textured material; on uplands.
Rough mountainous land-Rough broken land-Rock outcrop	Well-drained to excessively drained, very steep to precipitous lands of mountains and gulches.

Source: Foote et al., 1972.

Figure 3.2 Soil Associations on the Island of Kaua‘i.



3.2.2 HYDROLOGY

Kaua‘i’s hydrology differs somewhat from that of the other main Hawaiian Islands. As can be seen in Figure 3.4, most of the streams radiate out from the Wai‘ale‘ale-Kawaikini massif in all directions, cutting through intrusive dikes that retard the groundwater movement toward the ocean from high rainfall areas in the interior. In the process they tend to receive large influxes of groundwater throughout their length. Thus, unlike most Hawaiian streams, many of those on Kaua‘i actually gain flow as they descend (i.e., they are “gaining” streams). As a result of this, in some parts of Kaua‘i more than 65 percent of the water falling on the ground appears as streamflow. This proportion is far higher than the 30 percent of mean annual rainfall that the U.S. Geological Survey estimates runs off as streamflow statewide.

Even on Kaua‘i, the percentage of rainfall that directly runs off varies spatially among basins and temporally within a basin. Within a basin, the percentage of rainfall that runs off varies temporally among individual storms, and may range from less than 5 to greater than 90 percent. The percentage of rainfall that runs off is generally highest in areas that have relatively high average rainfall, experience high-intensity rainfall, have low-permeability soils, have steep slopes, possess a water table at or near the land surface, or where the antecedent soil moisture is high.

As illustrated by the examples shown in Figure 3.3 on the right, there are substantial differences between different drainages with respect to the seasonality of streamflow, the percentage of the flow that represents base flow, total discharge, and other factors.

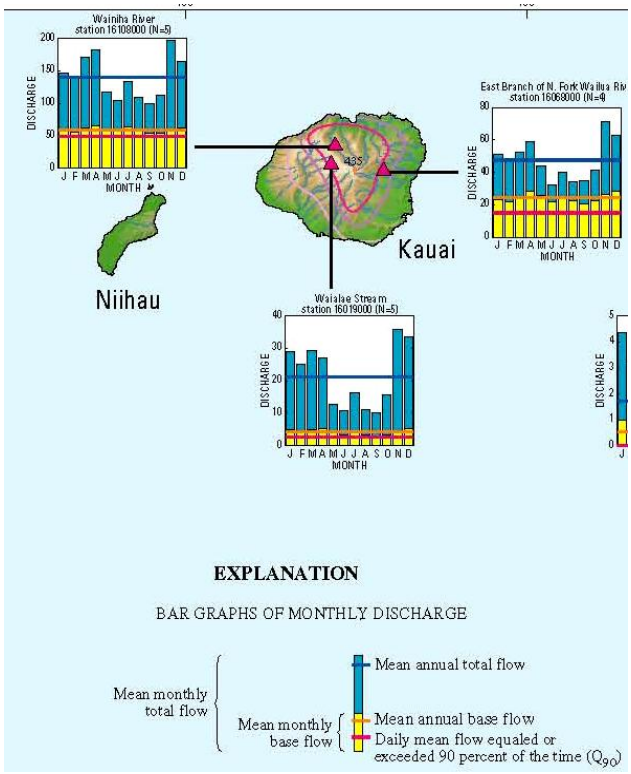
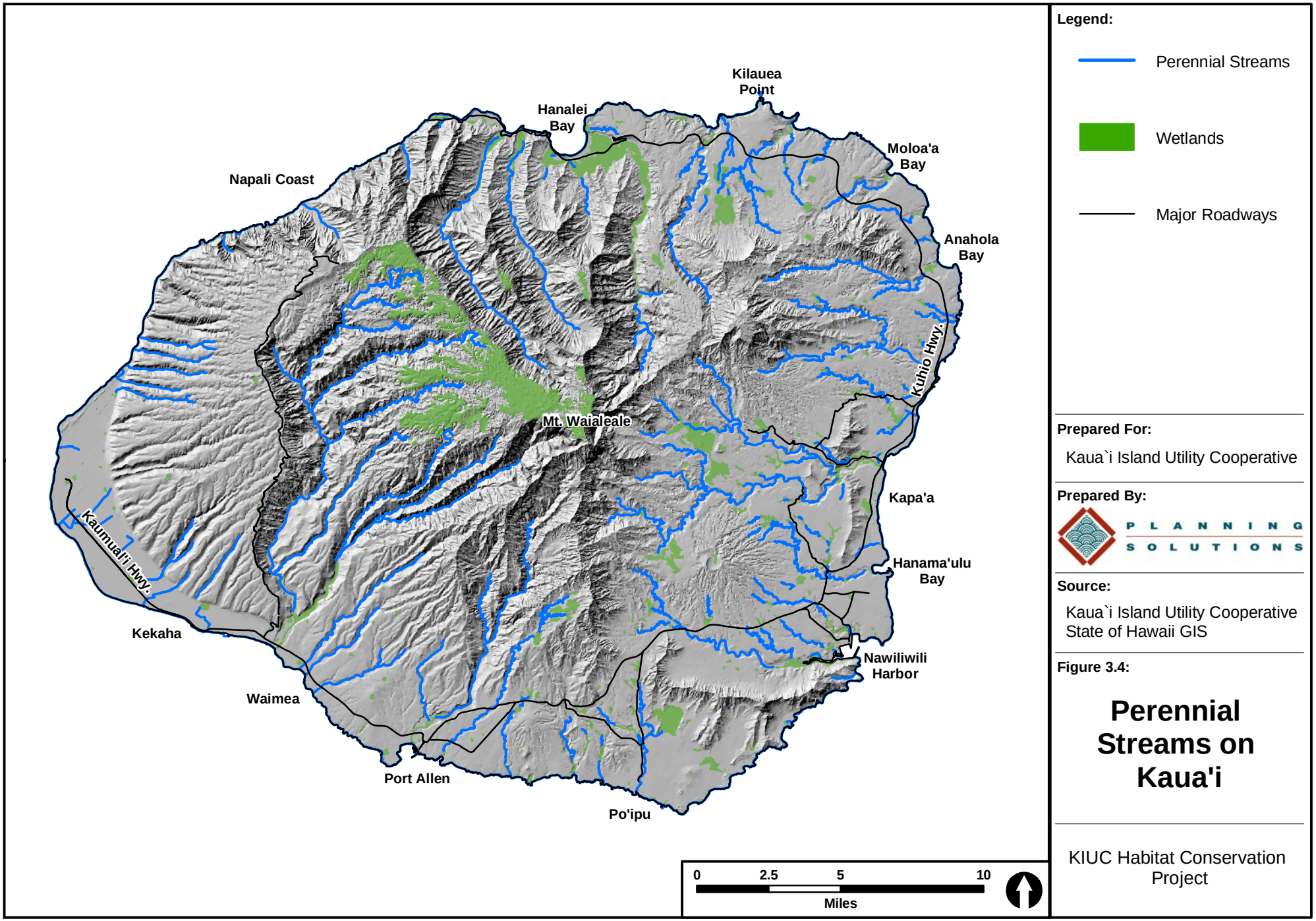


Figure 3.3 Streamflow at Selected Locations.

At 19.5 miles, the Waimea River-Po‘omau Stream is the longest stream on Kaua‘i. Other long rivers on the island include the Makaweli River (15.1 miles), the Wainiha River (13.8 miles), the Hanapēpē River (13.3 miles), and the Wailua River (11.8 miles). At 140 million gallons per day, the Hanalei River has the highest average discharge. Occupying 424 acres, the Waitā Reservoir, which is located on the southern side of the island near Kōloa, is the largest surface water body.


Kilauea Point
Hanalei Bay
Napali Coast
Moloa'a Bay
Anahola Bay
Kuhio Hwy.
Mt. Waialeale
Kapa'a
Kaumualiʻi Hwy.
Hanama'ulu Bay
Kekaha
Nawiliwili Harbor
Waimea
Port Allen
Po'ipu
0
2.5
5
10
Miles
Legend:
Perennial Streams
Wetlands
Major Roadways
Prepared For:
Kaua`i Island Utility Cooperative
Prepared By:
PLANNING SOLUTIONS
Source:
Kaua`i Island Utility Cooperative
State of Hawaii GIS
Figure 3.4:
Perennial Streams on Kaua'i
KIUC Habitat Conservation Project
Figure 3-4 Perennial Streams on Kaua'i 2008-04-28.mxd

3.2.3 CLIMATE AND WEATHER

3.2.3.1 Wind

The northeast trade winds are the most important determinant of Kaua‘i’s climate. They represent the outflow of air from the high pressure region known as the Pacific Anticyclone, whose typical location is well north and east of Hawai‘i. The trade wind zone moves north and south seasonally with the sun, so that it reaches its northernmost position in the summer half-year. Consequently, the trade winds are strongest and most persistent from May through September, when the trades are prevalent 80 to 95 percent of the time. From October through April, Hawai‘i is located to the north of the heart of the trade winds, and their frequency decreases to about 50 percent (as a monthly average). On a few exposed headlands and in mountains that catch and concentrate the full force of the trades, winds above 40 miles per hour may occur several days each month of the year. In nearly all other locations, however, such winds occur only occasionally, and then only as the result of a major storm, the passage of a cold front, or an unusual local situation.

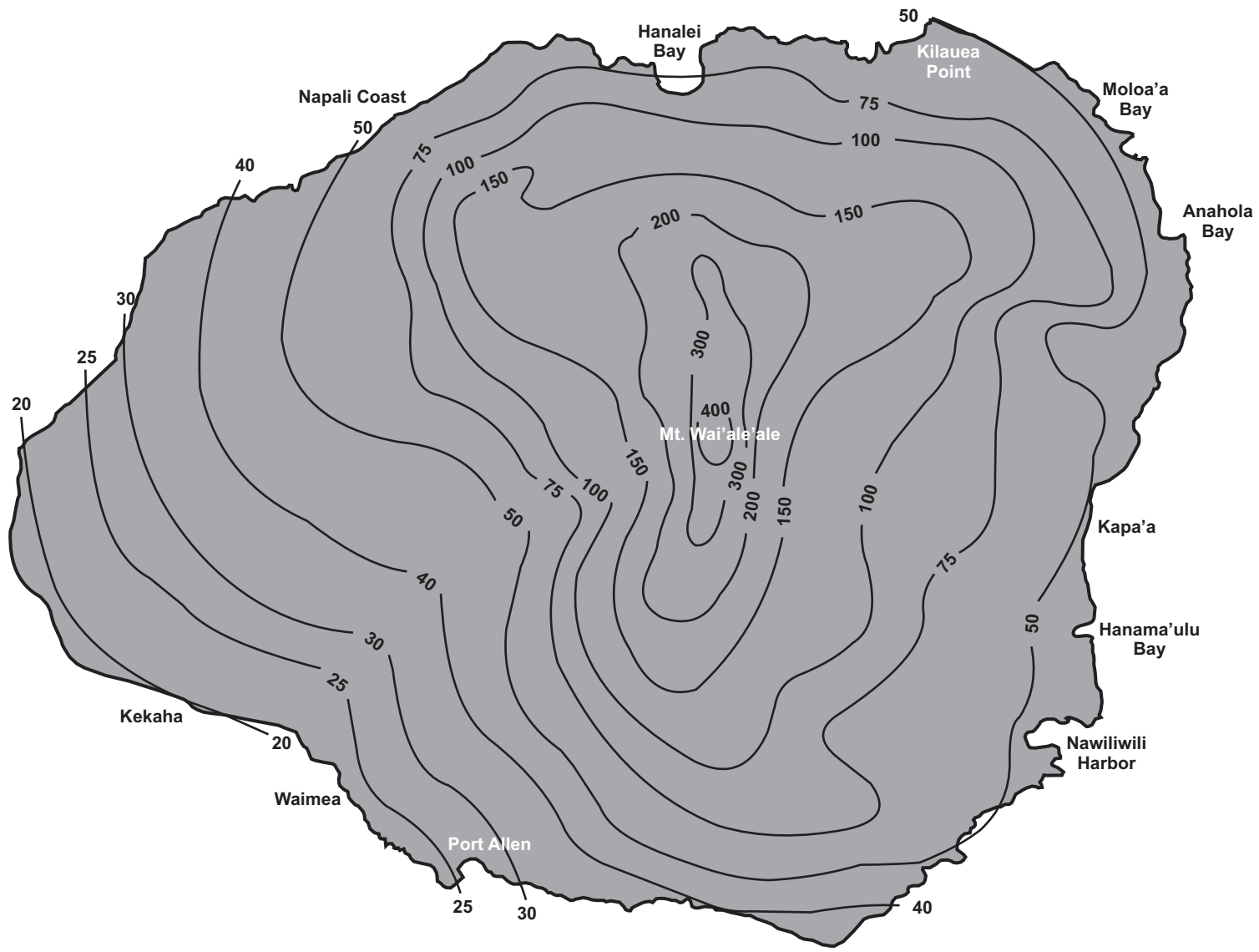
The land and sea circulations are on a far smaller scale than the circulations of the major storm systems, with the exchange of air often being confined to a few square miles. Circulations of this kind are most common on the southern and western coast, in locations that are to the leeward with reference to the trade winds and topographically sheltered from them, e.g., the Barking Sands area. Land and sea air circulation exhibit a diurnal rhythm. From the late morning until the early evening air moves inland on a sea breeze; sometimes these sea breezes are fairly brisk. During the night and until shortly after sunrise, the air drifts back from land to sea; this movement is usually quite gentle.

Kaua‘i’s topography interacts with the winds to produce large variations in conditions from one locality to another. Air blowing inland as part of the trade wind flow is redirected horizontally and vertically by the mountains and valleys. This complex three-dimensional flow of air results in marked differences from place to place in wind speed, cloudiness, and rainfall. Together with variations in the elevation of the land, it results in differences in air temperature.

3.2.3.2 Rainfall

Rainfall on Kaua‘i varies greatly from place-to-place. Average annual rainfall at Waimea on the island’s southwestern shore is less than 30 inches. Twenty miles away at the summit of Wai‘ale‘ale, it is more than 450 inches. The majority of inland areas that represent potential nesting habitat for Hawaiian petrels and Newell’s shearwaters exhibit average annual rainfall of 100 inches or more. Extreme rainfall intensities are high. To take the most extreme instance on record, during the storm of January 24-25, 1956, over 38 inches of rain fell at the Kīlauea Sugar Plantation Office within a 24-hour period, out of a storm total of 43.5 inches. During the same storm six inches of rain fell during a single 30-minute period and about 12 inches fell in a single hour.

While rainfall can be extremely heavy, very light showers are extremely frequent in most localities. On windward coasts, for example, it is common to have up to 10 brief showers in a single day, none of them producing more than 0.01 inch of rain. This seeming contradiction is explained by the fact that the usual run of trade-wind weather yields many light showers in the lowlands. Mountain slopes and crests within the cloud belt receive water in the form of fog drip or cloud mists as well as outright rainfall. This “fog drip” may contribute two-thirds as much water to vegetation and soil in that area as does rainfall itself – and proportionately more when rainfall is light.



Note: Rainfall amounts in inches.

Prepared For:

Kaua'i Island Utility Cooperative

Prepared By:

PLANNING SOLUTIONS

Source:

State of Hawai'i DLNR Div. of Water & Land Development; Report R42 *Climatologic Stations In Hawai'i*

Figure 3.5:

Average Annual Rainfall

KIUC Habitat Conservation Plan

Figure 3-5 Average Rainfall 2008-04-28.cdr

3.2.3.3 Temperature

The temperature regime is not as variable from place to place as is rainfall but there are substantial geographic differences, chiefly as the result of variations in elevation. Diurnal temperature ranges are smallest in the lowlands, with daytime temperatures commonly in the 70's to 80's and nighttime temperatures in the 60's to 70's. Mean annual temperatures, which range between about 72° and 75° F. near sea level, decrease by about 2.5° to 3° F. for each 1,000 feet of elevation.

Outside the dry, leeward areas, temperatures of 90° F and above are quite uncommon. In the leeward areas, temperatures in the low 90's may be reached on several days during the year, but temperatures higher than these are uncommon. The warmest days are usually during Kona weather, when the trade winds, which come from cooler latitudes, fail and air stagnates over the heated islands. At elevations below 1,000 feet, the lowest nighttime temperatures on record have been in the 50's, except in relatively cloudless areas such as the leeward coasts where temperatures in the high 40's have been known to occur. These are extreme values, and it is possible for several years to pass without temperatures near 50° F being experienced near sea level. August is the warmest month of the year on Kauaʻi, and February is the coolest. The average difference between the highest and lowest temperature experienced on any one day is typically between 10° and 20° F; the higher readings occur in areas that are lower, drier, and less exposed to the wind.

3.2.3.4 Hurricanes, Tropical Storms, and Waterspouts

In addition to the trade winds, major storm systems affect the Hawaiian Islands. These occur most frequently from October through March, when there may be two, three, or even as many as six or seven major storm events in any particular year. Such storms typically bring heavy rains and are sometimes accompanied by strong winds. The storms may be associated with the passage of a cold front – the leading edge of a mass of relatively cool air that is moving from west to east or from northwest to southeast. The storms may also be associated with a large eddy, or "Low", that draws in moist, warm air, producing tremendous clouds and torrential rains.

Hurricanes and tropical storms[21] have directly affected Kauaʻi on a number of occasions over the past 50 years. Figure 3.6 shows the tracks of hurricanes that have affected the Hawaiian Islands since 1950 and Table 3.2 summarizes their most important characteristics. Hurricanes are infrequent, but they have had a great effect on Kauaʻi. The two most recent hurricanes to hit Kauaʻi (Iwa, which struck the Island on Nov. 23, 1982, and ʻIniki, which hit on Sept. 11, 1992) have been the most devastating with respect to KIUC's facilities and operations.

The County estimates that Hurricane ʻIniki caused more than $1.8 billion damage to the island, not including the impact on employment and the quality of life for Kauaʻi citizens. In addition to damaging or destroying over 14,000 homes, the storm decimated the island's electrical infrastructure. While the power plants suffered relatively little damage, the transmission and distribution lines that deliver the power to customers was largely destroyed and had to be largely rebuilt (see Table 3.3). Kauai Electric, KIUC's predecessor, estimates that Hurricane ʻIniki caused $62,298,000 in damages. Because it recovered only $3,308,000 from insurance, the net cost of the storm was nearly 59 million.

[21] A "Hurricane" is an intense tropical weather systems with well defined circulation and maximum sustained winds of 74 mph (64 knots) or higher. A "Tropical Storm" is an organized system of strong thunderstorms with a defined circulation and maximum sustained winds of 39 to 73 mph.

Figure 3.6 Tracks of Major Storms: 1950 to 2000.

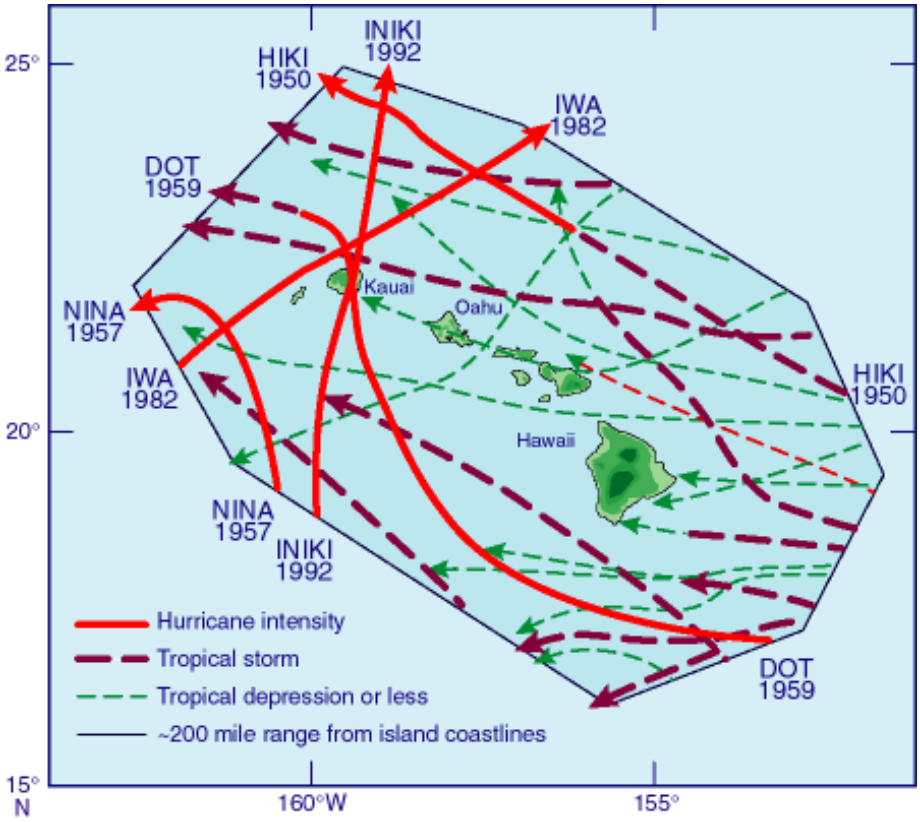


Table 3.2. Major Hurricanes Affecting Kaua'i: 1950 to 2002.

Name	Date	Maximum recorded winds ashore (m.p.h.)		Category*	Deaths	Property damage (mil. $)
		Sustained	Peak gusts			
Hiki	Aug. 15-17, 1950	68	(NA)	1	1	0.2
Nina	Dec. 1-2, 1957	(NA)	92	1	1	0.1
Dot	Aug. 6, 1959	81	103	2	-	5.5+
Iwa	Nov. 23, 1982	65	117	3	1	234.0
'Iniki	Sept. 11, 1992	92	143	4	8	1,900

*Note: Category is based on the Saffir-Simpson Hurricane Scale:
Category 1, wind speed of 74-95 mph, minimal damage.
Category 2, wind speed of 96-110 mph, Moderate damage.
Category 3 wind speed of 111-130 mph, Extensive damage.
Category 4 wind speed of 131-155 mph, Extreme damage.
Category 5 wind speed of >155 mph, Catastrophic damage.

Source: State of Hawai'i, Department of Business, Economic Development & Tourism (DBEDT) 2002.

Table 3.3. Damage to KIUC Facilities by Hurricane 'Iniki.

Transmission and Distribution	*Poles and Lines*		*Downed Poles as % of Total*
	Total No.	*No. Downed*	
Transmission Poles	1,700	450	26%
Distribution Poles	15,300	4,545	30%
Total	17,000	4,995	29%
Source: Oahu Civil Defense Agency, City And County Of Honolulu, Hawai'i, http://www.mothernature-hawaii.com/files/honolulu_planning-09.pdf			

Both Hurricanes 'Iwa and 'Iniki had direct and indirect impacts on the three Covered Species. Hurricane 'Iwa likely resulted in few direct deaths because it hit the Island very late in the nesting season. 'Iniki on the other hand, likely did directly kill a number of birds, since it's landfall coincided with the height of the nesting season. However, it is not possible to quantify the direct effect that either storm had on populations of these species.

Both hurricanes resulted in significant changes in vegetation on the Island, especially that found within the more remote area of the interior. Hurricane force winds denuded large areas of densely forested valley walls. At one known Newell's shearwater colony at Kaluahonu, located on the south facing flank of Hā'upu Ridge, between Kawaimanu and Kāmaulele peaks, north of the abandoned Kōloa Mill, most of the 'Ōhi'a lehua (*Metrosideros polymorpha*)/ uluhe (*Dicranopteris linearis*) forest was destroyed. This damage allowed more aggressive alien plant species, including, rose myrtle (*Rhodomyrtus tomentosa*), strawberry guava (*Psidium cattleianum*), common guava (*Psidium guajav*a), Moluccan albizia, (*Falcataria moluccana*) Java plum (*Syzygium cumini*), silk oak (*Grevillea robusta*), and kiawe (*Prosopis pallida*), to almost completely overrun the colony site, resulting in it's abandonment (David 2003a). Whether this phenomenon was repeated at other colonies is unknown, however, the habitat conversion resulting from wind damage was extensive in many areas on the island.

3.2.3.5 Tsunami

As is true throughout Hawai'i, low-lying shoreline areas on Kaua'i are susceptible to periodic inundation by tsunami. The greatest wave heights usually occur near where the offshore bathymetry is steepest, and a tsunami's size and run-up can vary considerably within very short distances. For example, during the 1965 tsunami on the north shore of Kaua'i, a run-up of 35 feet was recorded at Hā'ena , while only a few miles away in Hanalei Bay, the run-up was only three feet. While tsunami can have substantial effects on low-lying coastal areas, their effects do not extend inland to the habitat used by the Covered Species.

3.2.3.6 El Niño/Southern Oscillation

Fishermen along the Pacific coast of South America coined the term El Niño to refer to a seasonal invasion of warm southward ocean current that displaces the more typical north-flowing cold current in which they normally fished. Today, the term no longer refers to the local seasonal current shift but to part of a phenomenon known as El Niño-Southern Oscillation (ENSO), a continual but irregular cycle of shifts in ocean and atmospheric conditions that affect the globe. El Niño has come to refer to the more pronounced weather effects associated with anomalously warm sea surface temperatures interacting with the air above it in the eastern and central Pacific Ocean. Its counterpart – effects associated with colder-than-usual sea surface temperatures in the region – is known as "La Niña".

Pelagic seabirds are generally thought to depend on often distant, limited, or ephemeral food supplies of small fish and squid. Seabird population are restricted by the availability of these prey items in their pelagic feeding grounds (Diamond 1978, Schreiber and Schreiber 1984). ENSO events temporarily change climatic conditions, ocean currents and the productivity and abundance of seabird

prey. The impact of ENSO events on seabirds has been well documented along the coasts of Ecuador and Peru (Cushing 1982). In the Central Pacific, ENSO events have been shown to have resulted in almost total reproductive failure and the deaths of tens of thousands of birds in large seabird colonies on Christmas Island (Schreiber and Schreiber 1984). These anomalous abiotic events serve as a natural evolutionary forcing mechanism, controlling populations of seabirds in the tropical Pacific Ocean.

3.2.4 AIR QUALITY

Air quality on the island is generally good. This is a function of the island's mid-ocean location, the persistent regional winds, and the absence of substantial industry. In 2006, 24-hour PM_{10} (10-micron size particulate matter) concentrations at the single State of Hawai'i Department of Health monitoring station in Līhu'e ranged from a low of 0 microgram per cubic meter to a high of 34 microgram per cubic meter. The average for the entire year was 11 microgram per cubic meter. At no time did the concentration exceed 25 percent of the 150 microgram per cubic meter State Standard for PM_{10} (State of Hawai'i Department of Health 2007).

KIUC's two generating stations (Port Allen and Kapaia) are the only notable sources of air emissions for which it is responsible. Both locations are designated as a PSD Class II area. The air quality within both areas is classified as attainment for all criteria pollutants, and the existing air quality in both areas is considered good. Port Allen and Kapaia operate under air permits issued by the State of Hawai'i Department of Health.

- The permit for the Kapaia Power Station (KPS) covers one 27.5 MW combustion turbine generator (CTG), one 600 kW black start diesel engine generator, and three internal floating roof petroleum storage tanks. Other emission sources at the KPS that the State Department of Health has deemed insignificant include: one 141 kW diesel fire pump engine, one 150 kW emergency diesel engine generator, and three fixed roof petroleum storage tanks.

The Covered Source Permit for the Port Allen Generating Station is for the operation of Gas Turbine Generator Unit GT-1 (18.1 MW nominal), Gas Turbine Generator Unit GT-2(22.845 MW nominal), General Electric Heat Recovery Steam Generator (HRSG), four 7.86 MW Diesel Engine Generators (Unit Nos. 6-9), and other smaller diesel-powered generating units (see Table 3.4 for details).

Table 3.4. Equipment Specifications at Port Allen Generating Station.

Unit Number	***Manufacturer***	***Model***	***Rated Capacity(MW)***
D-1, D-2	GM EMD Diesel Generator	16-567-D4	1.8 each
D-3, D-4, D-5	GM EMD Diesel Generator	16-645-E4	2.5 each
D-6 thru D-9	Stork-Wartsila Diesel Generator	6TM620	7.86
S-1	Combustion Eng. Steam Boiler/Turbine	20810	10
GT-1	Hitachi/GE Combustion Gas Turbine	PG 5251 M	18.1 (SC)/ 17.54 (CC)
GT-2	John Brown Combustion Gas Turbine	PG 5431	22.845 (SC)/ 22.110 (CC)
S-1	Combustion Eng. Steam Boiler/Turbine	20810	10
Source: U.S. EPA Region 9 Electronic Permit Submittal System Document Filer.			

3.2.5 SOUND LEVELS

The State of Hawai‘i regulates noise levels through the State of Hawai‘i Department of Health (DOH) regulations (HAR Title 11, Chapter 46, Community Noise Control). These regulations are also intended to protect public health and welfare, and to prevent significant degradation of the environment and quality of life. As shown in Table 3.5, it establishes maximum permissible sound levels (which are applicable at parcel boundaries) that are dependent on zoning designations and time of day.

Table 3.5. Maximum Permissible Sound Levels in dBA.

Zoning Districts	Daytime (7AM to 10PM)	Nighttime (10PM to 7AM)
Class A (residential, conservation, preservation, public space, open space)	55	45
Class B (multi-family dwellings, apartment, business, commercial, hotel, resort)	60	50
Class C (agriculture, country, industrial, similar)	70	70
Note: As defined in HAR 11-46 (the State of Hawai‘i Department of Health Community Noise regulations): "dBA" means the A-weighted sound level or unit of measurement describing the total sound level of all noises as measured with a sound level meter using the "A" weighting network. "Decibel" means the unit for measuring the volume of sound, equal to twenty times the logarithm to the base ten of the ratio of the pressure of the sound measured to the reference pressure, which is twenty micropascals (0.0002 dynes per square centimeter).		
Source: HAR Title 11, Chapter 46, Community Noise Control.		

Transmission and Distribution Facilities. KIUC’s transmission and distribution facilities are relatively quiet, with the noise from transformers located in substations being the loudest. There are three sources of sound/noise in power transformers. They are: (i) core noise, caused by magnetostriction[22] effects; (ii) load noise, caused by electromagnetic forces in the windings and structural parts due to leakage flux associated with the current, and (iii) noise generated by the operation of the cooling equipment, fans and pumps. While large transformers located close to noise-sensitive residences can be problematic, the relatively small size and generally isolated location of KIUC’s substations means that they have not traditionally been a significant noise source.

Electrical Power Generation Facilities. The equipment at KIUC’s power plants has the potential to generate relatively high noise levels. This varies substantially over the course of a 24-hour period as the number of generating units in operation and the load on each individual generating unit rises and falls in response to changing electrical demand. However, KIUC believes that all of its facilities currently meet the applicable noise limits.

[22] Magnetostriction is a term used for the small mechanical deformations of core laminations in response to the application of a magnetic field.

3.3 EXISTING BIOLOGICAL ENVIRONMENT

3.3.1 FLORA

Because of the age of the island and its relative isolation, the island of Kauaʻi has the highest levels of floristic diversity and endemism in Hawaiʻi. However, the native vegetation has undergone extreme alterations because of (1) past and present land use (primarily agriculture) and (2) the intentional and inadvertent introduction of non-native plants and animals. Browsing, digging and trampling by ungulates (pigs, goats, cattle, sheep and deer) have resulted in increased numbers of non-native plants because many of the non-native plants can colonize newly disturbed areas more quickly and effectively than can Hawaiʻi's native plants. Introduced rodents (rats and mice) feed on the fruits, seeds and new growth of many endemic plant species. In many instances rats have completely halted the recruitment of native palms and other species. Many of these endemic plants are now extinct, forced out by "alien", or introduced, plants, of which there are now more than 4,600 species. Many of the remaining endemic species are now listed as threatened or endangered. As a result, native forests are now limited to Kauaʻi's upper-elevation, moist and wet regions.

The USFWS has designated approximately 99,200 acres of the island in 15 units as Critical Habitat for 83 threatened and endangered plant species on Kauaʻi (USFWS 2003b, 2002b). Each of these Critical Habitat units provides one or more of the primary constituent elements essential for the conservation of the plant species.[23] Nearly all of the acreage is in uninhabited, remote areas (see Figure 3.7). More recently, USFWS proposed to list an additions 48 species as endangered (45 plants and 3 animals) endemic to the island of Kauaʻi based on their shared ecosystems and common threats (USFWS, 2008). At total of 27,674 acres is proposed as critical habitat for 47 of these species; 94 percent (26,028 acres) of the proposed critical habitat overlaps existing critical habitat for other species.

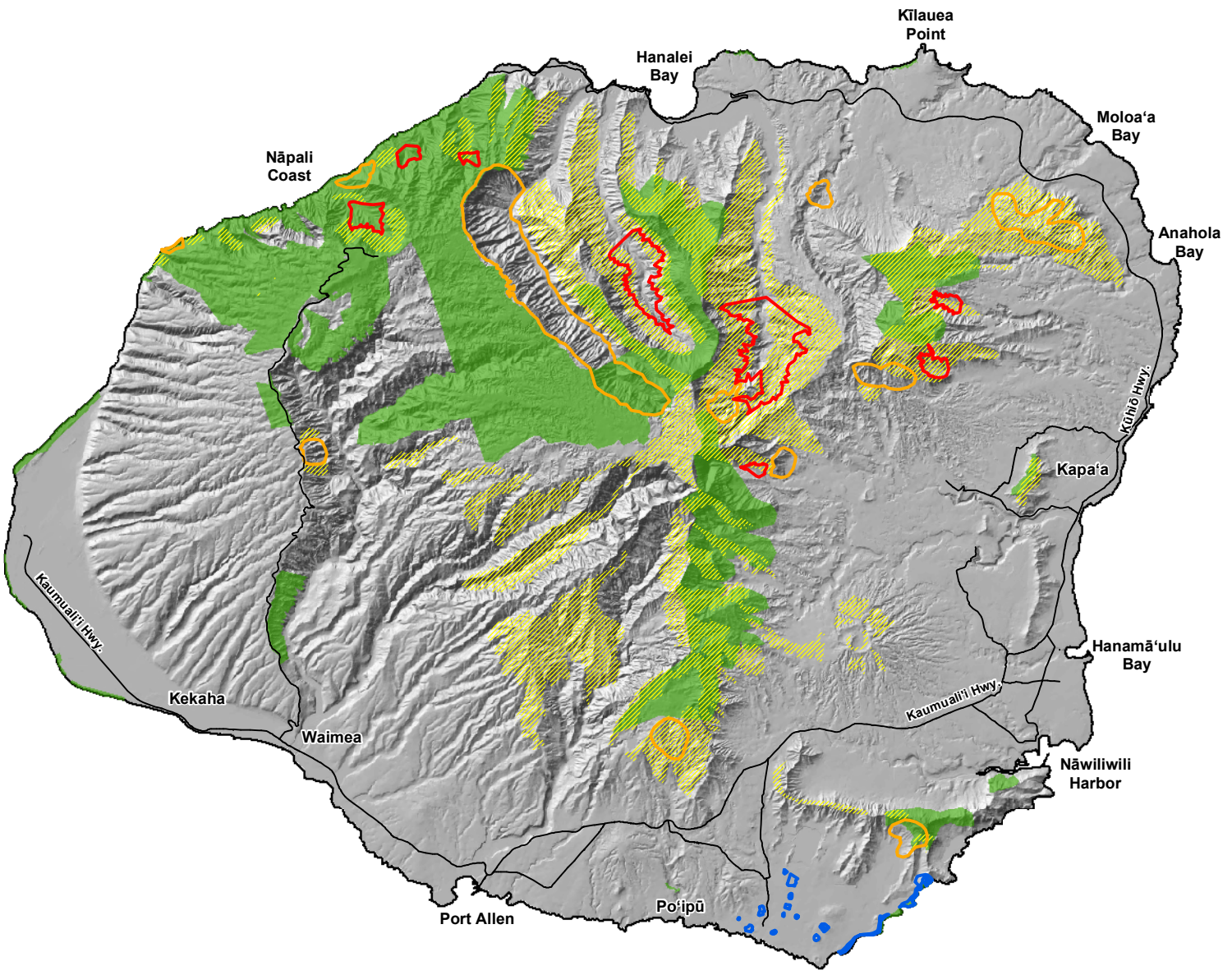
3.3.2 FAUNA – OVERVIEW

3.3.2.1 Mammals

The only native terrestrial mammalian species currently known from the Islands are the ʻIlio holo I kauaua, Hawaiian monk seal (*Monachus schauinslandi*) and the ʻŌpeʻapeʻa, Hawaiian hoary bat. All other mammalian species on Kauaʻi are alien species. Both the Hawaiian monk seal and the Hawaiian hoary bat are Federally listed endangered species. The endemic Hawaiian monk seal, though an ocean dwelling mammal, does spend part of its life on land. The monk seal is occasionally seen hauled out, either sleeping or sunning on beaches and within intertidal zones around the island. It does not occupy areas where KIUC facilities are, or are likely to be, located.

Hawaiian hoary bats have an island-wide distribution, occurring seasonally from sea level to the summit of Mount Waiʻaleʻale. Thus, individuals of this species do occupy inland areas where the potential for interaction with KIUC facilities is present. The Hawaiian hoary bat is a typical lasurine bat, and as such, they primarily lead a solitary existence, described as "over-dispersed". They generally roost cryptically in foliage, which makes them difficult to study (Findley and Tomich 1983, Jacobs 1994, Carter et al. 2000).

[23] Because existing man-made features and structures within the mapped Critical Habitat units do not contain and are unlikely to develop primary constituent elements of Critical Habitat, they are excluded from designated Critical Habitat areas. Excluded man-made features and structures include: aqueducts and other water system features; arboreta and gardens; buildings, electrical power transmission lines and associated rights-of-way; heiau (indigenous places of worship or shrines); hydroelectric power plants; missile launch sites; radars; residences—single-family homes and condominiums; roads; shoreline navigational aids; State parks; telecommunications towers and associated structures and equipment; telemetry antennas; and trails. (Federal Register 2003a)



Prepared For:

- Critical Snail Habitat
- Critical Cave Habitat
- Known Newell's Sheawater Nesting Colonies
- Potential Newell's Shearwater Nesting Habitat
- Critical Plant Habitat
- Major Roadways

Prepared For:

Kaua'i Island Utility Cooperative

Prepared By:

PLANNING SOLUTIONS

Sources:

-U.S. Fish & Wildlife Service
-State of Hawai'i GIS
-Rana Biological Consulting, Inc.

Figure 3.7:

Critical Habitat Areas on Kaua'i

KIUC Habitat Conservation Program

Figure 3-7 Critical Habitat Areas on Kauai 20-09-11-09.mxd

Very little research into the life cycle, distribution, or population estimates of this species has been conducted; and much of what has been studied, were small, disconnected, or anecdotal studies as opposed to coherent controlled experiments. Fundamental research into this species distribution and life cycle has just begun (Bonaccorso et al. 2005). The Hawaiian hoary bat is primarily a nocturnal species, foraging on flying insects, which it tracks and captures using ultrasonic echo location.

Unlike nocturnally flying seabirds, which regularly collide with man-made structures, bats are uniquely adapted to avoid collision with most obstacles, man-made or natural. They navigate and locate their prey primarily by using ultrasonic echolocation, which is sensitive enough to allow them to locate and capture small flying insects at night. No bat/power line impacts have been documented. Hoary bats have been documented to have become impaled on barbed wire fences in the continental United States (Iwen 1958) and Hawai‘i (Jeffrey 2007, pers. comm.). In addition, bats may be less able to avoid human activity during the bat pupping/rearing season, which could make them more susceptible to harm from vegetation clearing and other related activities.

The other 13 mammalian species are all alien species that were introduced to the Hawaiian Islands by humans at different times since the Islands were first colonized by aboriginal settlers. Rats, cats, dogs and pigs are known to directly predate adult seabirds, their eggs and chicks. The six ungulates present on the Island also impact seabirds by converting native species-dominated vegetation habitats into alien-dominated ones. This habitat modification often eliminates key components necessary for the continued survival of native wildlife species and provides opportunities for alien plant species to invade and out-compete native species.

3.3.2.2 Birds

There are currently 59 breeding avian species known from the Island of Kaua‘i. Fourteen of these are endemic (i.e., native and unique to the Hawaiian Islands) species or sub-species, and 12 of these are listed as either threatened or endangered under the ESA. There are no documented effects of KIUC facilities or activities on nēnē (Hawaiian goose, *Brandt sandvicensis)*, ae‘o (Hawaiian stilt, *Himantopus mexicanus knudseni*), kōloa maoli (Hawaiian duck, *Anas wyvilliana*), *‘alae‘ula* (common moorhen, *Gallinula chloropus sanvicensis*), ‘alae ke‘oke‘o (Hawaiian coot, *Fulica alai*), or other listed bird species (other than the Covered Species). An additional eight species are indigenous (i.e., native to the Hawaiian Islands, but also found elsewhere naturally). In addition to the breeding species, about 100 additional species have been recorded as non-breeding migratory or extra-limital species over the past 50 years (Pyle 2002, Engilis et al., 2004, R. David unpublished field notes 1973-2007). A detailed discussion of the three avian species covered under the HCP is presented in Section 3.3.3.

3.3.2.3 Herpetofauna

The herpetofauna of the Hawaiian Islands currently consists of 28 species of reptiles and eight species of amphibians (McKeown 1996, Kraus et al. 1999, R. David unpublished field notes 1973-2007). Kaua‘i currently hosts 18 species of terrestrial and semi-aquatic reptiles and amphibians and two ocean dwelling reptiles. All of these with the exception of the two sea turtles are likely alien species, though as further genetic research is undertaken, it is possible that one or two of the small geckos will turn out to be indigenous (McKeown 1996). The two listed marine reptiles, Pacific green sea turtle (*Chelonia mydas agassizii*), and the Pacific hawksbill turtle (*Eretmochelys imbricata bissa*) are limited to the immediate shoreline where they are occasionally seen sleeping or sunning on beaches and within intertidal zones around the Island. Both species nest on sandy beaches, laying their eggs in a nest excavated in the sand by the laying turtle. The terrestrial areas used by these turtles are in areas where no KIUC facilities exist or are likely to be located in the future.

3.3.2.4 Insects and Mollusks

Insects are the dominant animals in most terrestrial ecosystems, especially on isolated oceanic islands such as Kaua‘i where many larger animals are absent. In Hawai‘i, the original colonizing species

evolved into perhaps 10,000 or more new species and adapted to live in the diverse island habitats.[24] These insects are important as pollinators of native plants, recyclers of nutrients in ecosystems, and food for native birds and other animals. Hawai‘i is home to close to 8,000 species of insects; some 5,300 of those are endemic, 84 are indigenous and over 2,600 are alien. There are occurrence records of over 4,000 alien insects in the Islands, though only about two-thirds of these have become established. Of the approximately 5,400 native insects currently known in Hawai‘i, roughly 98 percent are endemic. Moreover, it is likely that as additional entomological studies are conducted this number will increase. Today, many native species are declining from the combined effects of invasive non-native organisms and human alteration of habitats.

Only 16 out of 30 insect orders recognized worldwide are represented in the native fauna. Another 11 orders have become established through human activities. The beetles (*Coleoptera*), flies (*Diptera*), bees and wasps (*Hymenoptera*), and moths (*Lepidoptera*) are the largest groups in the Hawaiian Islands. About 63 percent of the identified species occur on only one island, and many have extremely restricted ranges within their island. Gagné and Howarth (1985) and Howarth (1991) have argued that alien parasitoids are the major factor contributing to the decline and extinction of many native insect species. Lepidopteran caterpillars were an important food source for native forest birds and other native organisms. Consequently, their observed decline may be affecting other parts of the forest community.

It is likely that Hawai‘i has already lost a significant proportion of its terrestrial arthropod fauna. While 36 arthropod species are recognized as extinct by the USFWS, populations of 2 species, a damselfly (*Megalagrion nesiotes*) and a sphinx moth (*Manduca blackburni*), have recently been rediscovered. Many Hawaiian insect groups are extremely host-specific; for example, some genera of long-horned beetles (*Plagithmysus*), with 139 known species, and leaf bugs (*Nesiomiris*), with over 50 species, occur on rare native plant hosts.

Kaua‘i is home to two endangered arthropod species, the Kaua‘i cave wolf spider (*Adelecosa anops*) and the Kaua‘i cave amphipod (*Spelaeorchestia koloana*) which dwell in mesocaverns and caves. Currently both species are known only from the Po‘ipū and Kukui‘ula areas of the Island and the USFWS designated Critical Habitat in 2003 (USFWS 2003a). It is conceivable that either or both species could be affected by undergrounding utility lines in that area if care is not taken to avoid the known populations and designated Critical Habitat for the two species.

The only mollusk species currently listed under the ESA on Kaua‘i is the threatened Newcomb’s snail (*Erinna newcombi*). The current known range of Newcomb’s snail is limited to very small sites located within six stream systems in north- and east-facing drainages on Kaua‘i. They are: Kalalau Stream, Lumaha‘i River, Hanalei River, Waipahe‘e Stream (a tributary to Keālia Stream), Makaleha Stream (a tributary to Kapa‘a Stream), and the North Fork Wailua River. Critical Habitat has been designated for Newcomb’s Snail along eight stream segments and associated tributaries, springs and seeps on Kaua‘i, totaling 12.28 miles (19.76 kilometers) of stream channel (USFWS 2002a). There are no documented effects of KIUC facilities or activities on these species.

3.3.3 COVERED SPECIES

This section contains relevant biological information concerning the three species of seabirds covered by the HCP.[25] Section 3.3.3.1 covers the Hawaiian petrel, Section 3.3.3.2 discusses the Newell’s shearwater, and Section 3.3.3.3 provides information on the band-rumped storm petrel. The discussions for each species include: (i) a description of their ecology and population biology; (ii)

[24] Information on the status of Hawaiian insects came from a data base compiled at the Bishop Museum of all published records on the taxonomy, biology, and distribution of Hawaiian arthropods (Nishida 1992).

[25] Since KIUC’s facilities and the Covered Activities described in the HCP do not affect other threatened or endangered species which occur on Kaua‘i (e.g., nēnē, kōloa, Hawaiian stilt, moorhen and Newcomb’s snail), no other such species are included as Covered Species .

their distribution, range, and abundance; and (iii) known current terrestrial threats to their survival. Figure 3.8 contains photographs of the three birds.

While the terrestrial threats noted in the species descriptions below have been the focus of much of the attention that researchers and resource managers have paid to the species, this does not mean that those factors are the most important with respect to the species' long-term survival on the Island of Kauaʻi. On the contrary, the available data show greater fluctuation (both apparent increases and seeming declines) in the species numbers on Kauaʻi than can be readily explained by changes believed to have occurred on the ground. Because this affects the extent to which on-ground management can ensure the survival of the species, consideration of these factors is warranted. Both federal and State wildlife agencies, as well as numerous Non-Government Organizations (NGO) are working hard to gather at-sea information on the life histories, foraging strategies, movement and a host of other critical issues related to identifying non-terrestrial threats and limiting factors that affect the long term viability of these species.

One possible explanation is that changes in the ocean have contributed substantially to the observed seabird population fluctuations. The exact nature of these oceanic changes and the way in which they actually affect the Covered Species are unknown. However, because scientists have documented decreased reproduction and increased mortality in seabirds coinciding with warmer water, one line of thinking is that it could be related to changes brought about by climate change.

Reductions in phytoplankton caused by warming sea temperatures can dramatically affect the food chain and, therefore, the health of seabirds near the top of the food chain. For example, Veit et al. (1996) reports that between 1987 and 1994 populations of sooty shearwaters (*Puffinus griseus*) off the coast of California and Washington dropped to 10 percent of their former levels during a period when sea surface temperatures increased. Shaffer et al. (2006) report a decline in sooty shearwater populations in recent years both at breeding colonies in New Zealand and at wintering grounds in the eastern North Pacific that they associate with concomitant increases in oceanic temperatures that may have limited regional biological productivity. Bradley (2006) reported a mass abandonment of nests by Cassin's auklets (*Ptychoramphus aleuticus*), a plankton-eater that dives for its krill prey. In 2005, Farallon auklets began breeding very late in April, and most abandoned their eggs during May. Noting that food web productivity and krill abundance depend on seasonal upwelling of cold, nutrient-rich water, which had been weak and intermittent that year, he speculated that this could be evidence of a warming trend in the Earth's ocean-climate. Veit and Montevecchi (2006) correlate a 70 percent decrease in zooplankton abundance and approximately a 1.3 ºF (0.75 °C) surface temperatures increase in the California Current with a concomitant decline in upper trophic level predators such as salmonids and seabirds. They conclude that the decline in sooty shearwaters is due, at least in part, to a decline in their prey base in the California Current.

Poor reproductive success has been repeatedly documented in warmer years, including El Niño years (Cushing 1982, Schreiber and Schreiber 1984, Ainley et al. 1995). Seabirds in the Farallon Islands off California laid fewer eggs, and fewer chicks hatched during warmer years (Ainley et al. 1994, 1996). Total reproductive failure and the deaths of tens of thousands of birds in large sooty terns (*Onychoprion fuscatus*) colonies on Christmas Island have been documented following significant El Niño years (Schreiber and Schreiber 1984).

A final, indirect threat to Newell's shearwaters relates to their dependence upon tuna to chase small prey items to the near-surface zone where they are within the birds' reach. Commercial tuna fishing has already placed several tuna species in jeopardy, and Ainley et al. (1997b) speculate that this may have made it more difficult for Newell's shearwaters to find food, thereby reducing the reproductive success of the species.

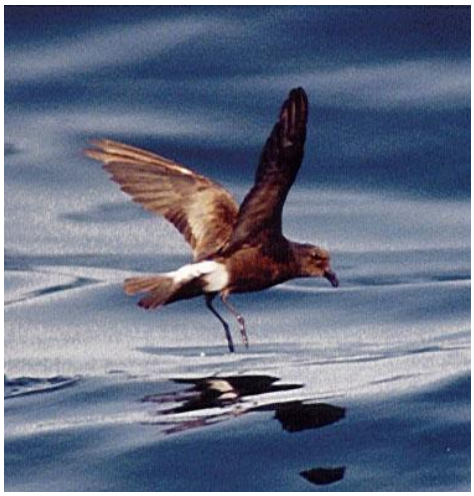
Figure 3.8 Photographs of the Covered Species.

a) Hawaiian petrel (*Pterodroma sandwichensis*)

b) Newell's shearwater (*Puffinus auricularis newelli*)

Source: Jack Jeffrey Photography©

c) band-rumped storm-petrel (*Oceanodroma castro*)



Source: Alabama Ornithological Society (Steve McConnell)

The abundance of prey is only one problem facing pelagic species such as the Covered Species as the climate changes – both the timing of peak prey abundances as well as the visibility of prey (due to ocean conditions) are also becoming issues for several seabirds in the northeastern Pacific and the eastern Atlantic. As regional sea surface temperatures increase off the Queen Charlotte Islands in British Columbia, Canada, populations of common murres (*Uria aalge*), tufted puffins (*Fratercua cirrhata*), rhinoceros auklets (*Cerorhinca monocerata*), and Cassin's auklets have all begun breeding earlier. Puffins and auklets have been observed to start their breeding season two weeks earlier than normal, and the common murres have started breeding a full month earlier than the same populations did in the 1970s.

The earlier breeding season is not a problem in and of itself; however, it means that these birds may be out of synch with their primary prey. Cassin's auklets eat zooplankton, and normally time their breeding cycle so their chicks hatch right after the zooplankton bloom. The zooplankton also respond to higher sea surface temperatures by blooming earlier than normal, but the zooplankton are blooming even earlier than the auklets are hatching, and thus the birds are unable to catch up.

Studies have shown that storms can significantly impact some bird populations, suggesting that increased storm activity expected from global warming may harm some species (Dunn 1975; Odsjo & Sondell 1976; Blake 1984; Poole 1989). Studies on common murres populations in the north Atlantic show that storms appear to impede fishing activities, so chicks either are fed less often (Birkhead 1976) or were brought smaller fish by the adults (Finney et al. 1999). The foraging adults also had to work harder to find their prey, spending more time underwater, and were away from the nest for longer periods of time (Finney et al. 1999). If storms increase in either frequency or severity as predicted, reproductive success of these birds could diminish.

Seabird populations currently are threatened by a number of factors beyond climate change, including over-fishing, pollution, and by-catch (being caught incidentally through fishing practices). These impacts may compound effects of climate change, and it is often difficult or impossible to determine the relative importance of the different factors involved. This is particularly true in the case of seabirds such as the Covered Species that are relatively long-lived with low recruitment where reduced reproduction will occur before the adult population decreases very much.

The USFWS listed the Hawaiian petrel as endangered in 1967 (U.S. Department of the Interior 1967); the Newell's shearwater was listed as threatened in 1975 (USFWS 1975); and the band-rumped storm petrel was petitioned for listing in 1989 (USFWS 1989). The Hawaiian dark-rumped petrel and Newell's Manx Shearwater Recovery Plan was published in 1983 (USFWS 1983).

3.3.3.1 Hawaiian Petrel

3.3.3.1.1 Ecology and Population Biology

The Hawaiian petrel or ʻUaʻu is a pelagic seabird of the Order Procellariiformes, Family Procellaridae. It was formerly considered to be a Hawaiian endemic subspecies of the nominate race of the dark-rumped petrel (*Pterodroma. p. phaeopygia*) (USFWS 1983). The Hawaiian sub-species has recently been elevated to a full species, based on work conducted by Tomkins and Milne (1991), and Browne et al. (1997), that differentiated the vocalizations and morphology between it and the nominate species (Banks et al. 2002). The nominate race has been renamed the Galapagos petrel (*Pterodroma phaeopygia*). Both species are typical long-winged gadfly petrels, easily confused in flight with several other like species.

Within and close to the breeding colonies Hawaiian petrels are quite vocal, and their vocalizations are distinctive. Hawaiian petrels are nocturnal feeders, subsisting primarily on squid, fish, and crustaceans caught near the sea surface (Simons 1985). Unlike shearwaters, Hawaiian petrels are not known to dive or swim below the surface (Pitman 1986). Hawaiian petrels forage widely across the central, northern and eastern Pacific Ocean, even during the breeding season (Pittman 1986, Warham 1990, Spear et al. 1995, Simons and Hodges 1998, Adams 2007). Satellite tagged birds have been

tracked traveling more than approximately 6,200 miles (10,000 kilometers) on a single foraging trip to-and-from their breeding colony on the island of Maui (Adams 2007).

Hawaiian petrels produce and store a high-calorie oil in their foregut, which most scientists presume functions to ensure nourishment for chicks despite the petrels' often unpredictable and widely dispersed food supply (Warham et al. 1976, Warham 1996, Jacob 1982). This oil production is unique to birds in the order Procellariiformes (Warham et al. 1976). Hawaiian petrels feed during both daylight hours as well as at night where they search for squid, flying fish, goatfish, lantern fish, skipjack tuna, hatchetfish, and similar species, which they find near the surface of the water (Wheeler 1975, Ballance et al. 1997, Simons 1985). Hawaiian petrels capture prey items primarily by scavenging on the surface of the ocean, though they have been recorded feeding by aerial dipping, pattering, scavenging and surface-seizing (Ashmole 1971, Pittman 1986).

Known Hawaiian petrel breeding areas on Kauaʻi are within interior valleys. Petrels on Kauaʻi excavate burrows beneath dense vegetation along valley headwalls, particularly favoring steep slopes covered with uluhe fern (*Dicranopteris spp.*), though in at least one valley, petrel burrows are concentrated on the valley floor in dense native forest (R. David, unpublished field notes 2003). On Maui and Hawaiʻi, relictual colonies[26] are mainly found in sparsely vegetated sub-humid and sub-alpine areas on Haleakalā and Mauna Loa, respectively. Hawaiian petrel nests in colonies on Maui and Hawaiʻi are typically widely dispersed, however densities in at least one colony matrix in Lumahaʻi Valley on Kauaʻi are apparently quite dense. Hawaiian petrels, like most other Procellariiformes, appear to exhibit high degrees of nest-site and mate fidelity year after year. Hawaiian petrels, along with the other Covered Species and other forest nesting seabirds, are an integral part of the forest nutrient cycle. The birds deposit a large quantity of nitrogen-rich fertilizer in the form of excrement in and around their burrows. In very wet forests such as those found on many Pacific Islands, soils are often relatively infertile and thus the added seabird generated nitrogen is significant.

The Hawaiian petrel breeding cycle is quite synchronous and follows a timing pattern characteristic of Procellariiformes in general. First, breeding occurs at approximately five to six years of age, with an estimated 89 percent of the adult population breeding each year. Birds begin arriving on breeding grounds and pairing in mid-February. A distinct pre-laying exodus occurs in late March, when breeding adults leave the colony just ahead of egg-laying, presumably to allow females time to acquire the nutrient reserves necessary for egg production, and for males to store energy for incubation . Egg-laying typically transpires between late April and mid-May, with chicks hatching in July and August after an average incubation period of 55 days (Simons 1985). Each pair produces only one egg per year. Hatching success at Haleakalā has been estimated at approximately 70 percent (Hodges 1994), but no comparable data are available from Kauaʻi, where the nests have never been studied (principally because of their very remote location, on very steep and inaccessible terrain). At the time of hatching, failed breeders and non-breeding adults depart the colony.

Although there have been no studies of the breeding biology of this species on Kauaʻi it is probable that their breeding biology is similar to that of birds studied on Maui, and likely similar to that of other similar petrels such as the Galapagos petrel, which has been studied extensively. If so, then it can be stated that chicks are born with a soft, powdery down, which is replaced after 2 weeks by a slightly heavier down. The chicks spend most of their time sleeping, although they can move around the nest burrow. Both adults spend their time flying to sea to feed and bring food home for the chicks; this occurs at diminishing intervals over the span of the nestling period, which averages about 110 days total. Growth rate of the chicks is extremely fast. The size of a meal can vary from 10 to 110 grams, the latter figure represents more than one quarter of a parent's weight. This amount of food is likely the most an adult can carry.

[26] The term "relictual colony" refers to a colony of a species which is extinct over much of its former range but which persists in a few areas.

Fledging begins in late September, during which time breeding adults begin to leave the nest. By the end of November most adult and successful fledgling birds (estimated at about 85 percent of nestlings) have departed the islands (Simons 1985). It is probable that parental feeding visits drop to just one or two in the final month, causing the weight of the chicks to drop precipitously. Some individuals are deserted by their parents up to six weeks before they fledge, while others are fed right up to the day of departure. Once the chicks leave they will not return to land again for several years, when they will return to nest. Hawaiian petrels are long-lived, with birds banded on Maui commonly reaching 35 years of age (Simons and Hodges 1998).

3.3.3.1.2 Distribution, Range, and Abundance

Historical information on the distribution of this species in the Hawaiian Islands is very spotty. Following the initial description of this species in the 1880's there were few records of the species between the early 1900's and the 1930's, followed by a steady accumulation of reports and information between the 1940's and the present day (Banko 1980). Whether Hawaiian petrels were truly extremely rare in those years, possibly due to human and introduced mammalian predation, or rather people simply were unaware of these nocturnal seabirds is unclear.

Within recent historic times, Hawaiian petrels have bred on Maui, Kauaʻi, Lānaʻi and Hawaiʻi (Richardson and Woodside 1954, Simons and Hodges 1998, Pyle 1987, Telfer et al. 1987, DOFAW unpublished data 2006, 2007). The species is thought to be extirpated on Oʻahu (Harrison 1990).

All attempts to estimate either world or individual island populations have been fraught with major problems. Spear et al. (1995) estimated from at-sea densities that the world population of dark-rumped petrels was 19,000, with at least 5,000 pairs nesting on Kauaʻi and 1,600 pairs on Maui (Ainley et al. 1997a). The recently re-discovered Hawaiian petrel colony on Lanaʻi appears, based on survey efforts, to contain at least as many as, if not more than the Haleakala population, thousands of birds, rather than hundreds of birds as first surmised (Penniman 2007, pers. comm.).

The breeding population on Maui is relatively stable, due in large part to predator control efforts and protection by the National Park Service (Simons 1985, Hodges 1994). The population nesting within Haleakala National Park is increasing (Bailey 2008, pers. comm.). The status of the Hawaiian petrel population on the Island of Hawaiʻi is unknown, although it is believed to be declining due to continued predation by introduced mammals. The breeding populations on Kauaʻi are similarly under-researched, although the number of fledglings grounded each year and retrieved by the Save Our Shearwater (SOS) Program has remained steady, averaging 10 individuals per year from 1979 to 2006 (SOS Program Data).

3.3.3.1.3 Current Threats

Most Procellariiformes, including Hawaiian petrels, have evolved in ecosystems free of terrestrial mammalian predators, and they are for the most part naïve of the threats that these predators pose to them. The only known native predator of Hawaiian petrels is the short-eared owl or pueo (*Asio flammeus sandwichensis*), which causes some mortality at breeding colonies. Many biologists believe that predation of nesting Hawaiian petrels by introduced mammals such as the roof rat (*Rattus r. rattus*), Norway rat (*Rattus n. norvegicus*) Polynesian rat (*Rattus exulans hawaiiensis*), domestic cat (*Felis catus*), domestic dogs (*Canis f. familiaris*) and the small Indian mongoose (*Herpestes a. auropunctatus*) is the most serious cause of mortality and breeding failure. Furthermore, they believe it has contributed significantly to the decline of the species. Small Indian mongooses have been thought to be absent from Kauaʻi, but there have been a few recent reported sightings.[27] The nonnative barn owl (*Tyto alba*) are known to prey on adult Newell's shearwaters (Ainley et al. 1997b) so may prey on Hawaiian petrel as well. Habitat destruction and alteration from pigs (*Sus s. scrofa*)

[27] In late February 2004, State wildlife officials and environmentalists on the Kauai Invasive Species Committee set traps in East Kauai after a reported mongoose sighting. There have been previous reported sightings, but trapping efforts in the locales where the sightings took place failed to catch any of the animals. Wildlife Services / USDA has taken over the duties of looking into reported mongoose sightings on Kauai, but has not documented mongoose on the island either. Hence, at least at present this predator is presumed absent from Kauaʻi.

uprooting burrows and facilitating the introduction of non-native plant species poses another serious threat to Hawaiian petrels (Ainley *et al*. 1997a, Cooper and Day 2003).

Artificial light sources and associated structures (e.g., fences, buildings, power lines, and telephone poles) constitute another anthropogenic threat to Hawaiian petrels. Particularly in urbanized areas of Maui and Kauaʻi, petrels have fallen to the ground after colliding with structures or becoming disoriented by artificial lights. While the numbers of downed petrels documented on Kauaʻi per year have remained relatively small (averaging 10 birds annually), the threat posed by artificial lighting and structures will likely increase over time unless more bird-friendly designs are incorporated into new lights, power lines, etc.

3.3.3.2 Newell's Shearwater

3.3.3.2.1 Ecology and Population Biology

The Newell's shearwater or ʻAʻo, is an endemic Hawaiian sub-species of the nominate species, the Townsend's shearwater (*Puffinus a. auricularis*) of the eastern Pacific.[28] Its size and black and white coloring make it superficially similar in appearance to several other shearwater species that occur in the central and northern Pacific which are sometimes referred to as Manx-type shearwaters (see Figure 3.8b).

Most Newell's shearwater colonies are found at high elevations approximately 525 to 3,937 feet (160 to 1,200 meters), often in isolated locations and/or on slopes greater than 65 degrees (Ainley et al. 1997b). Typical vegetation around colonies consists of open native forest dominated by ʻōhia with a dense understory of uluhe fern. The birds nest in short burrows excavated into the crumbly volcanic rock and ground, usually under dense vegetation, and under the base of trees. Burrows on Kauaʻi ranged in depth from approximately 18-69 inches (46-175 cm) with an average of 35 inches ± 8.74 SD (87.78cm ± 22.2 SD) (Telfer 1986). A single egg is laid in the burrow and one adult bird remains on the egg while the second adult goes to sea to feed. Newell's shearwaters will not usually lay their eggs straight onto the ground if a nesting burrow is not available. Some colonies on Kauaʻi are located in vertical cliff faces, where birds presumably are nesting in rock crevices rather than creating burrows (Wood et al. 2001b). Once the chick has hatched and is large enough to withstand the cool temperatures of the mountains, both parents will go to sea to provide the growing chick with a daily supply of food. Newell's shearwaters arrive and leave their burrows in the mountains during darkness and birds are seldom seen near land during daylight hours.

The Newell's shearwater is a pelagic bird that forages over deep water east and south of Hawaiʻi, concentrating feeding in areas where tuna (*Thunnus* spp.) and other large, predatory fish have chased squid and other prey near to the ocean surface (Ainley et al. 1997b). The birds feed by pursuit-plunging, diving approximately 32 feet (10 meters) or more below the ocean surface to retrieve prey (Ashmole 1971).

First breeding occurs at approximately 6 years of age, after which breeding pairs produce up to one offspring per year. The high rate of non-breeding, among experienced adults occupying the colony during the summer breeding season, is comparable to that of similar species (Ainley et al. 2001). No specific data exist on longevity for this species, but other shearwaters may reach 30 years of age or more (see for example Bradley et al., 1989, del Hoyo et al. 1992). The Newell's shearwater breeding season begins in April, when birds return to prospect for nest sites. A pre-laying exodus follows in late April and possibly May, and egg-laying begins in the first two weeks of June and likely continues through the early part of July. The average incubation period is thought to be approximately 51 days (Telfer 1986). The fledging period is approximately 90 days. Most fledging takes place in October and November, with a few birds still fledging into December (SOS Data, DOFAW unpublished).

[28] While the U.S. Fish and Wildlife Service recognizes the Newell's Shearwater as a subspecies, it should be noted that the International Union for Conservation of Nature redlist and modern taxonomists recognize it as a full species.

Biologists have long believed that adult Newell's shearwaters leave the nesting colony before or during fledging. However, very recent radar and at-nest electronic monitoring indicate that at least some adults continue to feed their young through fledging, and in fact some adults remain in the colonies after the fledglings have left (R. David unpublished field notes 2004, R. David and B. Zaun personal communication 2004).

3.3.3.2.2 Distribution, Range, and Abundance

The Newell's shearwater is known to nest on Kauaʻi, Molokaʻi, and Hawaiʻi (Ainley et al. 1997, Day et al., 2003a, 2003b, Day and Cooper 2002). Newell's shearwaters may also nest on Maui (Cooper and Day 2003), and possibly in very small numbers on Oʻahu and Lānaʻi. Numbers of colonies and individuals are greatest on Kauaʻi where an estimated 80 percent of the species population breeds (Ainley et al. 1997b).

The marine range of Newell's shearwater closely overlaps that of the Hawaiian petrel, extending east as far as 120ºW, north up to 22ºN, and south to the equator near Hawaiʻi (Ainley et al. 1997b). Isolated records exist as far west as the Mariana Islands and Johnston Atoll and as far south as the Marquesas Islands and Samoa, with at least one record from California (Pratt et al. 1987; Maryl Faulkner, email of 8/3/07).

Spear et al. (1995) estimated the total year-round at-sea population of Newell's shearwaters in the Hawaiian Islands during the early 1990s at roughly 84,000 individuals (95 percent confidence interval of 57,000 to 115,000 for spring and 58,000 to 113,000 for autumn). Using Spear et al.'s total population estimate and allowing for an estimated 7,600 one-year-old birds that do not visit Kauaʻi, Ainley et al. (1995) estimated that the Kauaʻi Island population in the mid-1990s was approximately 65,000 birds, with a breeding population of about 14,600 pairs (Ainley et al. 1995).[29]

Using population models incorporating best estimates of breeding effort and success, Ainley et al. (2001) projected an annual population decrease of 3.2 percent. When anthropogenic variables influencing Newell's shearwater mortality (e.g., predation, light attraction, and power line collision) were included, their models predicted an annual population decline of 6.1 percent, or approximately 60 percent every 10 years. If this projection is accurate, then the current population ought to be around 50,000 birds. There is little empirical data to confirm whether this estimate is in fact valid. However, the available scientific data (particularly radar studies conducted over the past decade and SOS data (Day et al., 2003a; Planning Solutions Inc., 2003a, 2003b, 2004)) strongly suggest that the population of Newell's shearwater on Kauaʻi has declined sharply over the past 10 years.

The number of fledglings retrieved by the SOS Program on Kauaʻi has steadily declined since 1979, from an average of about 1,500 per year between 1979 and 1990 to an average of less than 500 collected between 1999 and 2006 (SOS Database, DOFAW unpublished). While sharply higher than the number retrieved by the SOS Program in 2005, the number of fledglings retrieved in 2006 (467) was still slightly below the 1999-2005 average. In addition, recent analysis of data trends from radar surveys revealed an overall decline of roughly 50-70 percent in detection rates between 1993 and 2001, although detections for 1999, 2000, and 2001 were similar (Day et al., 2003b). A smaller level of decline (less than 10 percent) may have occurred during the period 1999-2008; however, statistical evidence of a decline could not be detected using the current radar survey design (Deringer and Holmes 2009).

Cooper and Day (1995) states that the leading cause of the decline in population is predation by introduced mammals, although it acknowledges that there are a number of other potential contributing causes. The *Newell's Shearwater Five-year Workplan* drafted by the Newell's Shearwater Working

[29] The breeding population of 14,600 pairs was estimated by multiplying the total population of 84,000 by 0.637 (proportion of total population of breeding age [6 years or older]), and then by 0.547 (the breeding probability). This estimate assumes that all Newell's Shearwater breeding occurs on Kauaʻi.

Group[30] (October 2005) summarizes the causes contributing to the species population decline as predation, habitat degradation and loss, light attraction, collision with manmade structures, and natural disturbance. All these threats are discussed in detail in the following section.

3.3.3.2.3 Current Threats

Loss of existing and potential nesting habitat due to clearing of forests for agriculture and urban development, mining of cinder cones, and recent volcanic eruptions on the Island of Hawai'i are among the terrestrial factors believed to be contributing to the decline of Newell's shearwater. Newell's shearwater habitat has also been degraded by feral ungulates such as pigs and goats (*Capra h. hirca*), which now are managed as game species. Pigs and goats facilitate the invasion of nonnative plants and perhaps predators by browsing and trampling vegetation creating more openings. These animals also crush burrows and compact the soil. Invasive nonnative plants, such as Moluccan albizia, guava (*Psidium spp.*), and rose myrtle, displace native vegetation and can completely alter vegetation structure and substrates typical of shearwater nesting habitat. For example, the habitat at the Kāluahonu colony (southeastern Kaua'i) has been almost completely and perhaps irreversibly transformed in just a few years and is now dominated by nearly pure and impenetrable stands of rose myrtle and guava. Intensive surveys in 2003 indicate that the colony has either dramatically declined or been abandoned entirely (David 2003a).

Ground-nesting and fossorial (i.e., birds that are adapted for burrowing or digging) bird species, including shearwaters, petrels, and storm-petrels are especially vulnerable to predation by alien mammals (Hodges and Nagata 2001, Smith et al. 2002). Island nesting pelagic seabirds are particularly naïve to introduced predators, making predation a serious threat to adult seabirds as well as eggs and chicks. Predation by cats, and dogs on adult and sub-adult Newell's shearwaters, and Hawaiian petrels has been documented on Kaua'i, and Hawai'i, and rats are assumed to prey on the eggs and chicks of the Covered Species, although at present no data exist to document this. Barn owls also prey on adult Newell's shearwaters, to the point where barn owls respond to recorded shearwater vocalizations (Ainley et al. 1997b). Both barn and short-eared owls have been recorded during the course of ornithological radar studies at several colonies on Kaua'i (David et al. 2002). Up to 9 barn owls were recorded in the air at one time above the Kaluahonu, and the Anahola Memorial Site during the course of radar surveys conducted in 2002 (David et al. 2002). Other researchers have also recorded similar owl concentrations over suspected Newell's shearwater colonies on Kaua'i (R. David and T. Savre, personal communication, 2004).

Urbanization on Kaua'i, chiefly on the eastern and northern shores, has been positively correlated with increased groundings or "fallout" of fledgling shearwaters on their first nocturnal flight from the burrow to the sea (Telfer et al. 1987, Ainley et al. 2001). The young birds are attracted to and disoriented by light sources, and they occasionally collide with buildings, cars, and other obstacles, including power lines. More frequently they simply fall to the ground, exhausted after fluttering around lights for long periods (Ainley et al. 1997b, Podolsky et al. 1998). Risk of grounding for fledglings seems to increase on and around the new moon. Adult shearwaters apparently are not attracted to lights to the same degree as fledglings, but adults do collide with power lines (Cooper and Day 1998).

Once shearwaters are grounded they become extremely vulnerable to alien mammalian predators and other hazards, as it is very difficult for them to take flight from flat ground (Ainley et al. 1997b). The SOS Program on Kaua'i has retrieved and released over 30,000 downed Newell's shearwaters since 1979, giving them veterinary attention as needed, and then releasing them at elevated hack sites overlooking the ocean from which they can easily take flight. These efforts result in about 90 percent of retrieved birds being returned to the wild each year, most of whom would almost certainly have perished otherwise (SOS Database, DOFAW unpublished). Very few of the more than 30,000

[30] The Newell's Shearwater Working Group, created by the USFWS, is an informal working group consisting of experienced seabird scientists from USFWS, DLNR, and other entities.

seabirds that have been banded and released under the program since it began in the 1970's have been recovered in subsequent years. However, approximately 98 percent of all birds retrieved and handled by the SOS Program are fledglings making their maiden flight to sea and thus would not previously have been banded. The long-term survival of birds banded by the SOS Program could only be determined by conducting extensive searches within breeding colonies to determine the relative abundance of banded birds.

3.3.3.3 Band-rumped Storm-Petrel

3.3.3.3.1 Ecology and Population Biology

The band-rumped storm-petrel or ʻakeʻake is a small seabird about 8 inches (20 centimeters) long, weighing less than 1.5 ounces (40 grams). It is an overall blackish-brown bird with an evenly-cut white rump band and uppertail-coverts. Sexes are alike in size and appearance. There is little or no seasonal variation in plumage. Field identification can be difficult, because several other white-rumped species of storm-petrels are similar in size, color, and shape. However, vocalizations at breeding colonies are distinctive and can be used to identify the species (Allan 1962).

During the day, adults spend their time foraging on the ocean surface. Food consists mainly of small fish, squid, crustaceans, oily scraps of marine animal carcasses, and garbage remnants (King 1967; Harris 1969). Adults visit the nest site after dark, where they can be detected by their distinctive calls. Because no nests have ever been found in Hawaiʻi, information on the breeding biology of this species can only be surmised based on the known breeding biology of this species in other locales, such as the Galapagos Islands. Nests are placed in crevices, holes, and protected ledges along cliff faces, where a single egg is laid (Allan 1962; Harris 1969).

The species is long-lived (15 to 20 years) and probably does not breed until its third year (Ainley 1984). The nesting season occurs during the summer months, with adults establishing nesting territories in April or May. The incubation period averages 42 days (Harris 1969) and the young reach fledging stage in 64 to 70 days (Allan 1962; Harris 1969).

3.3.3.3.2 Distribution, Range, and Abundance

The band-rumped storm-petrel is a wide ranging species found in the subtropics of the Pacific and Atlantic Oceans (Harris 1969). Breeding populations in the Atlantic are restricted to the eastern portions of the ocean, primarily in the Azores island group off northwestern Africa (Cramp and Simmons 1977). Wintering populations may occur as far west as the mid-Atlantic, with small numbers regularly reaching the coasts of North and South America (Cramp and Simmons 1977). In the Pacific, there are three widely separated breeding populations--one in Japan, one in Hawaiʻi, and one in the Galapagos (Harris 1969; Richardson 1957). Populations in Japan and the Galapagos are comparatively large and number in the thousands (Coulter 1984; Hasegawa 1984), while the Hawaiian birds represent a small, remnant population of possibly only a few hundred pairs (Harrison et al.1984; Harrison *et al*. 1990). Extensive at-sea surveys of the Pacific have revealed a broad gap in distribution of the band-rumped storm-petrel to the east and west of Hawaiʻi (Pitman 1986; Spear et al. 1995.

Evidence of existing nesting populations of band-rumped storm-petrels in the Hawaiian Islands is based on detection of adult birds during breeding-season surveys and by retrieval of fledglings in the fall by persons involved in the SOS Program. Fledglings have been retrieved sporadically on the islands of Hawaiʻi and Kauaʻi, providing additional evidence of nesting colonies within the Hawaiian archipelago (Harrison et al. 1990, Banko et al. 1991).

Recent work by Wood et al. (2002) provides good evidence that the species nests on Kauaʻi. Despite the suggestion by Harrison et al. (1990) that the island of Kauaʻi had the largest population in the islands, breeding bird surveys on Kauaʻi in 1992 by the USFWS (USFWS, unpublished data, 1992) detected only a few band-rumped storm-petrels, and only along the north shore in Nuʻalolo Valley. Harrison et al. (1990) reported many band-rumped storm-petrels over the last 12 years on the south and southwest side of Kauaʻi at the mouths of Waimea Canyon and Hanapēpē Valley, and concluded

that band-rumped storm-petrels probably nested along the cliffs of these two valleys and elsewhere on the island. A search of Hanapēpē Valley in 1980 by J. Sincock revealed what appeared to be burrows, feathers, and feces on a cliff face 165 to 230 feet (50 to 70 meters) from the top of the cliff (Harrison et al. 1990). In 1992, almost the same location was occupied by common mynas (*Acridotheres tristis*), and band-rumped storm-petrels were not heard during nocturnal surveys (USFWS, unpublished data 1992). Crossin (1974) found band-rumped storm-petrels off the southern coast of Kauaʻi but speculated that the population on the island "cannot be large". In September 2001, Wood et al. (2001a, 2001b) heard band-rumped storm-petrels in Pōhakuao Valley, an isolated hanging valley on the Nāpali coast, and estimated that 50 to 60 birds were nesting on cliffs 1,200 to 1,500 feet (370 to 460 meters) in elevation.

Between April and October of 2002, Wood et al. (2002) gathered data on the distribution and abundance of the band-rumped storm-petrel at several locations on Kauaʻi. They concluded that there are nesting populations at several locations on the Island. These include Waimea Canyon (east of Waimea Canyon lookout); four sub-populations along the Nāpali Coast (Kalalau, Pōhakuao, Nuʻololo Aina, Nuʻololo Kai); one site in the Kokeʻe region of Awaʻawapuhi; one site, called Awaʻawapuhi vista, at the eastern rim of Nuʻalolo and Awaʻawapuhi Valleys (accessed from the Awaʻawapuhi Trail, Kokeʻe State Park); and Lehua Islet off the north coast of Niʻihau. Three other sites were monitored and appear to be general fly-by sites where the petrels are in transit to nearby nests, including upper Waimea Canyon; Honopu (Kōkeʻe); and Kalalau Rim (Kokeʻe). Five of the sites that this team investigated represent previously unpublished locations.

Worldwide population of the species is uncertain, but is most likely less than 25,000 breeding pairs. Based on their field investigations, Wood et al. (2001a, 2001b) estimated that there are approximately 200 nesting pairs on Kauaʻi.[31] Despite the strong evidence of the species presence described above, band-rumped storm-petrels remain the only seabird in the Hawaiian Islands for which the nest and eggs have not been found after western contact.

3.3.3.3.3 Current Threats

Sub-fossil remains of band-rumped storm-petrels have been found on Oʻahu and Molokaʻi and Hawaiʻi (Olson and James 1982, A. Ziegler personal communication, 1982), and their bones are abundant in some ancient Hawaiian midden (Wood et al. 2002). Slotterback (2002) and Athens et al. (1991) found bones of this species in sea level midden. They speculate that Hawaiian populations once nested in coastal sites throughout Hawaiʻi and loss of habitat and predation by introduced mammalian predators including humans has been an important factor in the decline of this species.

Introduced predators are believed to be the most serious terrestrial threats facing the band-rumped storm-petrel in Hawaiʻi. Rats, cats, dogs, mongoose and barn owls are likely culprits. The band-rumped storm-petrel, like the other seabirds covered by the HCP, lacks effective anti-predator behavior, and has a lengthy incubation and fledgling period, making adults, eggs, and young highly vulnerable to predation by introduced mammals. Wood et al. (2002) observed owls flying along basalt cliff faces where the band-rumped storm-petrels nest in Pōhakuao. These observations included consistent traffic of the short-eared owl, or pueo, during the day and the screeching of barn owls in the evening. Another impact to the band-rumped storm-petrel results from the effects of artificial lights on fledgling young and, to a lesser degree, adults. Artificial lighting of roadways, resorts, ballparks, residences, and other development in lower elevation areas both attracts and confuses night-flying storm-petrel fledglings, resulting in "fall-out" (Harrison et al. 1990) and collisions with buildings and other objects (Banko et al. 1991). Additional, unstudied factors that could affect the continued existence of the band-rumped storm-petrel include commercial fisheries interactions or alteration of the prey base upon which the Storm-Petrel depends.

[31] According to Wood et al., the range of nesting pairs stated for the Awaʻawapuhi and Waimea Canyon sites were general estimates. They expressed greater confidence in their estimates at the remaining sites as they were based on pin-pointing distinctive arriving calls, but not including calls that were repeated around general nesting locations. They recommended further research to better evaluate the number of nesting birds in each region.

3.3.4 PROTECTED SPECIES NOT COVERED BY THE HCP

As previously noted, other endangered species are present on Kauaʻi in areas where KIUC has on-ground infrastructure. Those species are nēnē (Hawaiian goose), aeʻo (Hawaiian stilt), kōloa maoli (Hawaiian duck), *ʻalaeʻula* (common moorhen), ʻalae keʻokeʻo (Hawaiian coot), and ʻŌpeʻapeʻa (Hawaiian hoary bat).

KIUC is not requesting coverage for take of any of these species for the following reasons. Unlike the three seabird species for which coverage is being sought (which fly to and from their nesting colonies under the cover of darkness), all of these bird species typically fly during daylight. This, together with their acute vision, mean that it is unlikely that KIUC's on-ground infrastructure poses a direct threat to any of these species, as they readily can and do avoid utility lines.[32]

The Hawaiian hoary bat is widely distributed on Kauaʻi, especially in the lowland areas. However, there is no current empirical data suggesting that bats have collided or will likely collide with utility structures on Kauaʻi. While hoary bats have been documented to have become impaled on barbed wire fences in the continental United States (Iwen 1958) and Hawaiʻi (Jeffrey 2007, pers. comm.) and some KIUC facilities are surrounded by chained-link security fencing with barbed wire at the top, no bats have been found to have been injured by these fences. Hoary bats are drawn to outdoor lighting, as these tend to attract and concentrate flying insects that the bats forage on. However, their excellent visual and echolocation abilities together with their relatively low flying speed mean that they are not at significant risk from harm as a result of collisions with KIUC facilities and KIUC is not requesting this species be included in the ITP. Similarly, KIUC has instituted operational controls to ensure that take of Hawaiian hoary bats (*Lasiurus cinereus semotus*) does not occur in connection with vegetation management that it must carry out to keep its system working.

3.4 EXISTING SOCIO-ECONOMIC ENVIRONMENT, INFRASTRUCTURE, PUBLIC SERVICES, AND LAND USE

Most of the residents of Kauaʻi live in towns scattered around the perimeter of the island, primarily along the eastern and southern shores. A few smaller communities are found on the north shore of the island. There are no towns on the northwest side of the island (the Nā Pali coast) or in the mountainous interior. Consequently, the primary interaction between birds and human activity occurs as the birds fly between their nests in the mountains and the ocean. Over the next 10 years, the County of Kauaʻi Planning Department expects most of the growth on the island to be in Kukuiʻula and Poʻipū along the south shore; Līhuʻe, Wailua, and Kapaʻa on the windward side; the Princeville area on the island's north shore; other existing urban centers; and some agricultural subdivisions. It anticipates little or no growth in the mountainous interior of the island.

3.4.1 POPULATION SIZE AND AGE

According to the 2000 U.S. Census, Kauaʻi's Year 2000 resident population was 58,500, about 14 percent higher than in 1990. The total island population amounted to 4.8 percent of the Hawaiʻi's population, making it the least populated of the State's four major counties (Honolulu, Maui, Kauaʻi, and Hawaiʻi, excluding Kalawao County).

A 2008 U.S. Census estimate (U.S. Census Bureau; Hawaiʻi State Department of Business, Economic Development & Tourism, Statistics & Data Support Branch as reported in Table 1.06 at http://hawaii.gov/dbedt/info/economic/databook/ Data_Book_time_series/) suggested the population

[32] It is worth noting that unlike their continental cousins none of these species are migratory. This is important because when migrating in continental land areas, birds tend to congregate in large numbers and fly through relatively narrow corridors en masse, and often at night). Those behavioral characteristics, absent in the species in Hawaiʻi, create a risk of collision with tall man-made structures, such as large guyed television towers, that does not exist for the five species for which coverage is not being requested.

of Kauaʻi County reached 63,689, a nearly 9 percent increase since 2000. Despite the growth, Kauaʻi remains the least populated of the State's four major counties.

The U.S. Census' American Community Survey 3-Year Estimates 2006-2008 Data Set for Kauaʻi County provides a wide range of data that characterize the socio-economic characteristics of the County. It shows that the resident population is nearly evenly split between male and female and that the median age was 39.4 years. The age distribution was as follows:

Age Range	***Percent of Total Population***
Under 18 years	22
18 to 24 years	8
25 to 44 years	26
45 to 64 years	28
65 years and over	15

The same data indicate the following about ethnicity, housing, and household characteristics.

3.4.1.1 Ethnicity

As can be seen in Table 3.6 and in Table 3.7, Kauaʻi County (like the rest of Hawaiʻi) is a multi-ethnic community. The breakdown on the island is quite similar to that of the State as a whole. However, in general, there are relatively fewer Japanese and Chinese in the population than is true for the State as a whole, and rather more Filipinos and Caucasians.

Table 3.6. Ethnicity by County: 2008

Ethnic Stock 1/	***State Total***	***City and County of Honolulu***	***Hawaii County***	***Kauai County***	***Maui County***
All groups	1,257,607	880,308	172,004	62,669	142,626
Unmixed (except Hawaiian)	699,622	493,181	88,041	33,796	84,604
Caucasian	256,381	138,078	54,860	16,707	46,736
Black	7,380	6,842	195	144	199
Japanese	220,201	179,755	20,273	7,258	12,915
Chinese	47,767	44,706	1,688	405	968
Filipino	148,773	106,394	10,455	9,156	22,768
Korean	8,001	6,989	547	66	399
Samoan/Tongan	11,118	10,415	24	61	619
Mixed (except Hawaiian) 2/	252,147	185,796	31,991	11,674	22,685
Hawaiian/part Hawaiian	305,838	201,331	51,971	17,198	35,337

Note: Definitions used in this table differ from those in reports by the U.S. Census Bureau. In the 1980 and 1990 census tabulations, a person's ethnicity was determined by self-identification or by the race of the mother, thus mixed race was not a separate category. For the Census 2000, people were allowed to select more than one race.

1/ Ethnicity is based on the ethnicity of the father and mother (four possible listings for each parent).

2/ Includes other ethnicities not listed, don't know, refused or missing (58,743). The figure shown is the weighted figure.

Source: Hawaiʻi State Department of Health, Office of Health Status Monitoring, special tabulation from the Hawaiʻi Health Survey.

3.4.1.2 Household Characteristics

In 2006-2008 there were 22,000 households in Kauaʻi County, and the average household size was 2.8 people. Families made up 71 percent of the total. Nearly three-quarters of the families consisted of married-couple families; the remainder were classified as "other families". Other population and household characteristics include the following.

- Nonfamily households made up 29 percent of all households in Kauaʻi County. Three-quarters of the nonfamily households were people living alone; the other quarter consisted of people living in households in which no one was related to the householder.
- Of people reporting one race alone, 9 percent were Native Hawaiian and Other Pacific Islander, 32 percent were Asian, 35 percent were White. Twenty-two percent reported two or more races. Ten percent of the people in Kauaʻi County reported being Hispanic.
- Eighty-seven percent of the people living in the County during this period were born in the United States. Of those, two-thirds were born in Hawaiʻi. Thirteen percent of the people living in Kauaʻi County in 2006-2008 were foreign-born.

Table 3.7. Kauaʻi County Ethnicity Compared to Statewide Ethnicity: 2000.

Ethnic stock 1/	*State total*		*Kauai County*	
	Number	*Percent*	*Number*	*Percent*
All groups	1,257,607		62,669	
Unmixed (except Hawaiian)	699,622	55.6%	33,796	53.9%
Caucasian	256,381	20.4%	16,707	26.7%
Black	7,380	0.6%	144	0.2%
Japanese	220,201	17.5%	7,258	11.6%
Chinese	47,767	3.8%	405	0.6%
Filipino	148,773	11.8%	9,156	14.6%
Korean	8,001	0.6%	66	0.1%
Samoan/Tongan	11,118	0.9%	61	0.1%
Mixed (except Hawaiian) 2/	252,147	20.0%	11,674	18.6%
Hawaiian/part Hawaiian	305,838	24.3	17,198	27.4%
Note: Definitions used in this table differ from those in reports by the U.S. Census Bureau. In the 1980 and 1990 census tabulations, a person's ethnicity was determined by self-identification or by the race of the mother, thus mixed race was not a separate category. For the Census 2000, people were allowed to select more than one race.				
1/ Ethnicity is based on the ethnicity of the father and mother (four possible listings for each parent).				
2/ Includes other ethnicities not listed, don't know, refused or missing (58,743). The figure shown is the weighted figure.				
Source: Hawaiʻi State Department of Health, Office of Health Status Monitoring, special tabulation from the Hawaiʻi Health Survey.				

- Among people at least five years old living in Kauaʻi County in 2006-2008, 18 percent spoke a language other than English at home. Of those, only a small fraction (8 percent) spoke Spanish; most spoke some other language; 38 percent reported that they did not speak English "very well."

- The survey results indicated that 84 percent of the people at least one year old living in Kauaʻi County were living in the same residence one year earlier; 10 percent had moved during the past year from another residence in the same county, 2 percent from another county in the same state, 4 percent from another state, and 1 percent from abroad.
- The educational level of Kauaʻi County residents is moderately high. Nearly 90 percent of people 25 years and over had at least graduated from high school and almost a quarter had a bachelor's degree or higher.
- The total school enrollment in Kauaʻi County was 13,000. Nursery school and kindergarten enrollment accounted for 1,400 and elementary or high school enrollment was 9,800 children. College or graduate school enrollment was 2,200.
- As detailed in Table 3.8, the median income of households in Kauaʻi County during the 2006-2008 survey period was $62,359. Eighty-two percent of the households received earnings and 20 percent received retirement income other than Social Security.
- Thirty-two percent of the households received Social Security. The average income from Social Security was $14,434. These income sources are not mutually exclusive; that is, some households received income from more than one source.
- In 2006-2008, 8 percent of Kauaʻi residents had incomes at or below the official poverty line. Nine percent of related children under 18 were below the poverty level, compared with 8 percent of people 65 years old and over. Seven percent of all families and 21 percent of families with a female householder and no husband present had incomes below the poverty level.
- As might be expected on an island with limited public transportation, nearly all households (96 percent) reported having access to a car, truck, or van for private use. Multi-vehicle households are common (41 percent said they have two vehicles and another 28 percent said they have three or more).

3.4.1.3 Housing Characteristics

In 2006-2008, Kauaʻi County had a total of approximately 29,000 housing units. Of the total housing units, three-quarters were in single-unit structures, and one-quarter in multi-unit structures; very few (less than one-half percent) were mobile homes. The housing stock is relatively new, on average, with nearly 30 percent having been built since 1990. Approximately 22,000 of the housing units were occupied; of those, 14,000 (64 percent) were owner-occupied and 8,000 (36 percent) were renter-occupied. The survey reports one-quarter of these as being vacant, but this is almost certainly the result of many being second homes that are occupied part time by their owners and left unused the remainder of the time.

The survey reported relatively high housing costs. Renters, who composed 46 percent of the total, had median rental payments of $1,245/month. The median monthly housing costs for homeowners with mortgages was $2,030; the average monthly housing cost reported by the 19 percent of the homeowners who did not have mortgages was $453. Fifty-two percent of owners with mortgages, 19 percent of owners without mortgages, and 46 percent of renters in Kauaʻi County reported spending 30 percent or more of household income on housing.

Table 3.8. Household Income and Benefits.

	Households	
Annual Household Income	***Number***	***Percent***
Less than $10,000	1,435	6.5%
$10,000 to $14,999	919	4.2%
$15,000 to $24,999	1,663	7.6%
$25,000 to $34,999	1,754	8.0%
$35,000 to $49,999	2,821	12.8%
$50,000 to $74,999	4,426	20.2%
$75,000 to $99,999	3,184	14.5%
$100,000 to $149,999	3,600	16.4%
$150,000 to $199,999	1,294	5.9%
$200,000 or more	862	3.9%
Total households	**21,958**	100.00%
Median household income	$62,359	
Mean household income (dollars)	$79,109	
No. of Households Reporting Earnings	17,914	81.6%
Mean earnings by Households Reporting Earnings	$76,077	
No. of Households with Social Security	7,122	32.4%
Mean Social Security income	$14,434	
No. of Households with retirement income	4,424	20.1%
Mean retirement income (dollars)	$20,528	
No. of Households with Supplemental Security Income	458	2.1%
Mean Supplemental Security Income	10,936	
With cash public assistance income	668	3.0%
Mean cash public assistance income (dollars)	4,774	
With Food Stamp benefits in the past 12 months	1,337	6.1%
Annual Family Income	**15,611**	**15,611**
Less than $10,000	665	4.3%
$10,000 to $14,999	317	2.0%
$15,000 to $24,999	1,059	6.8%
$25,000 to $34,999	1,199	7.7%
$35,000 to $49,999	1,812	11.6%
$50,000 to $74,999	3,423	21.9%
$75,000 to $99,999	2,537	16.3%
$100,000 to $149,999	2,670	17.1%
$150,000 to $199,999	1,146	7.3%
$200,000 or more	783	5.0%
Median annual family income	$70,010	
Mean annual family income	$87,890	
Per capita income (dollars)	28,755	

Source: Selected Economic Characteristics: 2006-2008, Data Set: 2006-2008 American Community Survey 3-Year Estimates, American Community Survey

3.4.2 ECONOMIC BASE

The principal economic driving force for the economy of Kauaʻi County is tourism and related expenditures. Over 1.25 million people visited Kauaʻi in 2006. The average daily visitor census in that year was just under 21,000. This means that on average one visitor was present for approximately every three residents (State of Hawaiʻi, DBEDT 2007). The visitor count rose to almost 1.3 million people in 2007, but declined sharply in 2008 as a result of the precipitous downturn in the world economy. DBEDT's provisional estimate of Kauaʻi visitor arrivals for all of 2008 is 1,033,449, down over 20 percent from the previous year. At this time, no one has accurate estimates of the speed at which the visitor arrivals are likely to recover, but DBEDT forecasts dated February 20, 2009, suggest that the number of statewide visitor arrivals in 2012 will still be over 6 percent below the number recorded in 2007.

Table 3.9 shows business activity and employment by industry sector for 2007 as reported by the U.S. Bureau of the Census, 2007 Economic Census.

Table 3.9. Sales and Employment by Industry Sector: Incorporated Businesses

2007 NAICS code	Industry description	No. of Establish-ments	Sales, shipments, receipts, or revenue (in $)	Annual revenue (in $)	No. emp-loyees	Ann. Payroll (as %)	Number of Employ-ees (as %)
44-45	Retail trade (NAICS 44-45)	379	$1,052,671,000	110,278,000	4,457	18.8%	21.8%
51	Information	26	N	10,848,000	266	1.9%	1.3%
53	Real estate and rental and leasing	168	$245,569,000	50,689,000	1,387	8.7%	6.8%
54	Professional, scientific, and technical services	134	$76,416,000	28,513,000	662	4.9%	3.2%
56	Administrative and Support and Waste Mang and Remediation Services	129	$151,166,000	62,026,000	2,277	10.6%	11.1%
61	Educational services	22	D	D	b		
62	Health care and social assistance	172	$266,450,000	119,652,000	2,729	20.4%	13.3%
71	Arts, entertainment, and recreation	41	$45,946,000	14,558,000	717	2.5%	3.5%
72	Accommodation and food services	234	$591,483,000	168,764,000	7,082	28.8%	34.6%
81	Other services (except public administration)	134	$65,587,000	20,642,000	866	3.5%	4.2%
	TOTAL	1,439	$2,495,288,000	585,970,000	20,443	100.0%	100.0%

Source: U.S. Bureau of the Census, 2007 Economic Census

As shown in Table 3.10, as of 2008, Kauaʻi had approximately 9,200 visitor units, ranging from first-class resorts to hostels. Hotel rooms numbered about 2,575 and accounted for only a bit over one-quarter of the island-wide total inventory. An almost equal number of the visitor accommodations were condominium hotels, and a slightly smaller percentage were time share condominium units. Almost two-thirds of all units were located in two areas: Kōloa-Poʻipū-Kalāheo and Kawaihau.

Table 3.10. Visitor Unit Inventory Unit Type: 2007 and 2008.

Type	*2008 Units*	*2007 Units*	*Change From 2007*	*% Change From 2007*
Apartment/Hotel	8	8	0	0.0%
Bed & Breakfast	110	98	12	12.2%
Condominium Hotel	2,556	2,495	61	2.4%
Hostel	40	40	0	0.0%
Hotel	2,575	2,567	8	0.3%
Individual Vacation Unit	1,621	1,417	204	14.4%
Timeshare	2,276	2,035	241	11.8%
Other	17	32	-15	-46.9%
Total	9,203	8,692	511	5.9%
Source: Table 3, 2008 Visitor Plant Inventory. Hawai'i. Dept. of Business, Economic Development and Tourism.				

3.4.2.1 Agriculture

The importance of the visitor industry can also be seen in the 2006-2008 employment estimates shown in Table 3.11. As can be seen in Table 3.12, most of the jobs are in management and professional, sales & office, and service occupations.

Table 3.11. Employment of Persons Over 16 Years of Age by Industry: Kaua'i County

Industry	*% of Total Employment*
Agriculture, forestry, fishing and hunting, and mining	3
Construction	11
Manufacturing	2
Wholesale trade	1
Retail trade	16
Transportation and warehousing, and utilities	5
Information	1
Finance and insurance, and real estate and rental and leasing	6
Professional, scientific, management, administrative, & waste management services	9
Educational services, and health care and social assistance	14
Arts, entertainment, recreation, accommodation, & food services	20
Other Services, except public administration	4
Public administration	6
Note: Approximately 74 percent of the people employed were Private wage and salary workers; 15 percent were Federal, state, or local government workers; and 11 percent were self-employed.	
Source: Source: American Community Survey, 2006-2008.	

Table 3.12. Percent of Employment by Type of Occupation

Type of Occupation	*Percent of All Jobs*
Management, professional, and related occupations	31
Sales and office occupations	25
Service occupations	23
Construction, extraction, maintenance and repair occupations	12
Production, transportation, and material moving occupations	7
Note: Approximately 74 percent of the people employed were Private wage and salary workers; 15 percent were Federal, state, or local government workers; and 11 percent were self-employed.	
Source: Source: American Community Survey, 2006-2008.	

Sugarcane cultivation, which was the economic mainstay of Kauaʻi for more than a century, has now completely ceased. Some of the fields have been planted in diversified crops, including coffee, papaya and other fruits, seed corn, flowers and nursery products, vegetables and melons. A few areas have been converted to aquaculture, and some former sugarcane fields have been used for residential and other urban development. Despite this, most of the former sugarcane land is now used for grazing cattle which, in recent years, has allowed a growing cattle industry on Kauaʻi even though grazing is a comparatively low-value use of the land. Due to the demise of the sugar industry, agriculture is now the smallest of the three major industries (State of Hawaiʻi, Department of Labor and Industrial Relations, June 2009), and it employees only 3 percent of the island's workers. This is likely to remain true, though it is possible that some expansion may occur, especially if biofuels become a viable source of power.

3.4.3 PUBLIC INFRASTRUCTURE

3.4.3.1 Ground Transportation Facilities

3.4.3.1.1 Highways and Roads

Kauaʻi's regional roadway system consists principally of two-lane roads connecting major developed areas on the island. These two-lane facilities vary in quality from a narrow, winding highway north of Hanalei to high-quality arterial highways, such as Kūhiō Highway, Kaumualiʻi Highway, and Kapule Highway. A short segment of four-lane, undivided highway is located in Līhuʻe town and a three-lane section is located between Hanamāʻulu and Waipouli. Kauaʻi is served by two major highways that connect in Līhuʻe. The southern and western parts of the island are served by Kaumualiʻi Highway (Route 50), which begins at its intersection with Kūhiō Highway (Route 56) in Līhuʻe, and ends at Mānā on the west shore of Kauaʻi. The east and northern sections of the island are served by Kūhiō Highway, which begins at its intersection with Kaumualiʻi Highway in Līhuʻe and ends at Hāʻena on the north shore.

As described in the Kauaʻi General Plan, the existing roadways serving the various regions of Kauaʻi are:

- West Side – Kaumualiʻi Highway, a two-lane State arterial road, is the primary highway connecting the West Side to Kalāheo, Līhuʻe, and points eastward. Kaumualiʻi Highway extends west from ʻEleʻele/Port Allen to Mānā. Kōkeʻe Road is the main route providing access mauka to Waimea Canyon and Kōkeʻe State Park.
- Kalāheo-Poʻipū-Kōloa – Kaumualiʻi Highway is the primary highway connecting the Kalāheo-P-Kōloa Planning District to Līhuʻe on the east and to Port Allen/'Eleʻele on the west. Other major roads are County-owned. They include Maluhia Road, Poʻipū Road, the Poʻipū By-pass, and Kōloa Road.

- Līhuʻe – This region is the hub which connects the two belt highways, Kaumualiʻi Highway (serving west Kauaʻi) and Kūhiō Highway (serving east Kauaʻi). Kapule Highway has been constructed to bypass Līhuʻe Town, connecting the Airport, Harbor, and industrial areas with Wailua-Kapaʻa and other points on the east side.
- Kawaihau – Kūhiō Highway is the primary roadway serving the Kawaihau Planning District. It is a three-lane State arterial highway between its junction with Kapule Highway and Kamoa Road in Waipouli. Two lanes are northbound, and one lane is southbound; using contra-flow, the lane usage is reversed during the morning peak hour in order to accommodate Līhuʻe-bound commuters. Through and to the north of Kapaʻa Town to Moloaʻa, Kūhiō Highway is a two-lane arterial highway. The Kapaʻa by-pass route runs mauka of Kūhiō Highway. Major two-lane collector roads include Kuamoʻo Road (State) and Olohena Road (County), which provide access to the Wailua Homesteads area from Kūhiō Highway in Wailua and Kapaʻa. Kawaihau Road is a County-owned two-lane collector road connecting Kapaʻa Homesteads with Kūhiō Highway.
- North Shore – Kūhiō Highway is the only arterial road connecting the North Shore with the rest of Kauaʻi.

The island's main arterial roadways are congested, providing relatively low levels of service throughout much of the day. As documented in the Kauaʻi Long-Range Land Transportation Plan (State of Hawaiʻi Department of Transportation 1997), major roads in Līhuʻe, west to Maluhia Road, and east to Kapaʻa are rated Level of Service D, E or F for average daily traffic (ADT). Extremely poor conditions can be observed in Kapaʻa Town and during peak hours on Kaumualiʻi Highway leading into Līhuʻe. Collector roads, such as Kuamoʻo Road in Wailua, also suffer congestion during peak hours. Curing the existing deficiencies would require widening Kaumualiʻi Highway between Līhuʻe and Maluhia Road, as well as providing a permanent by-pass for Kapaʻa. Providing the needed improvements is estimated to cost several hundred million dollars, and only a fraction of that amount is available. This is particularly important as highway improvement dollars are a major potential source of the funds that would be needed to underground existing overhead electrical utility lines along public roadways.

3.4.3.1.2 Bus Transit

Public transit on Kauaʻi is quite limited. The Kauaʻi Bus operates a public (fixed route) bus service and a paratransit (door-to-door) bus service from Hanalei to Kekaha. The paratransit service is for senior citizens, participants in certain agency programs, individuals at the Wilcox Hospital Adult Day Care Center, and residents with disabilities. Currently, the system services thirteen bus routes; in March 2009 the system ridership was 37,198 from the general public and 5,257 paratransit passengers, for a total of 42,455 person-trips (http://www.kauai.gov/Government/Departments/TransportationAgency/TransitAdvisoryCommittee/tabid/476/Default.aspx). Ridership has more than doubled over the past decade.

3.4.3.2 Airports

The State Department of Transportation, Airports Division, operates two facilities on Kauaʻi. They are Līhuʻe Airport, the primary air terminal for the island; and Port Allen Airport, a general aviation airport with minimal facilities.

Līhuʻe Airport occupies 872 acres about 1.5 miles east of Līhuʻe. The airport, which serves as Kauaʻi's primary gateway for all arriving and departing residents and visitors, provides passenger and aircraft facilities for domestic overseas carriers, interisland carriers, commuter/air taxi, air cargo, and general aviation activities. Airfield facilities include two runways (6,500' x 150'), taxiways, aprons, 8 gates, navigational aids, airport traffic control tower, and helipads. During the last full year for which audited data are available (fiscal year 2008, which ended on June 30, 2008), 2,884,600 passengers enplaned or deplaned at the airport. During that same period there were just over 99,000 aircraft operations (State of Hawaiʻi, DBEDT 2009).

Port Allen Airport occupies 180 acres one mile southwest of the town on Hanapēpē. This general aviation airport has a single runway, separate parking areas for fixed-wing aircraft and helicopters, and a public parking area. There are no other public facilities at the airport. The principal planned improvements are the development of helicopter lease lots to the eastern end of the airport, construction of public comfort stations, and minor roadway improvements.

3.4.3.3 Harbors

3.4.3.3.1 Commercial Harbors

Kauaʻi's two commercial harbors, Nāwiliwili Harbor and Port Allen Harbor, are owned by the State of Hawaiʻi and operated by the Harbors Division of the State Department of Transportation. Nāwiliwili Harbor is by far the larger and more active of the two.

Nāwiliwili Harbor is located near Līhuʻe and major commercial and industrial facilities, and it serves as the island's primary commercial harbor. Facilities include three piers for the handling of both overseas and inter-island general and containerized cargo. The harbor is also used for charter boat fishing, recreational boating, and as a port-of-call for passenger cruise ships.

Port Allen Harbor is situated off of Hanapēpē Bay on the east side of the Hanapēpē River. The deepwater port has a single pier and complements the primary harbor facilities at Nāwiliwili on the east side of the island. Present waterfront activities at Port Allen include U.S. Naval vessels supporting activities of the Pacific Missile Range Facility, petroleum shipments, general cargo, commercial fisheries and other maritime activities.

3.4.3.3.2 Small Boat Harbors

Kauaʻi has four small boat harbors, Nāwiliwili , Port Allen, Kīkīaola, and Kukuiʻula. These facilities are owned by the State of Hawaiʻi and are managed by the State Department of Land and Natural Resources (DLNR), Division of Boating and Ocean Recreation (DOBOR). In addition, DOBOR manages various boat launching ramps.

Nāwiliwili Small Boat Harbor is located two miles southwest of Līhuʻe. The 32-acre facility has 48 berths, 12 moorings, two ramps, two piers, and a harbor office and restroom. It is located adjacent to the commercial harbor.

Port Allen Small Boat Harbor is located on the eastern shore of Hanapēpē Bay. This 12-acre facility has a two-lane 30-foot wide launch ramp, 34 berths, six moorings, one pier, a fish hoist, restrooms, a harbor office, and a parking area.

Kīkīaola Small Boat Harbor is located two miles west of the Waimea River mouth and close to the town of Kekaha on the Kauaʻi's southwest shore. It is about 16 acres in size and has 8 moorings and one ramp; the facility serves mainly as a small vessel launching facility for local commercial and pleasure craft.

Kukuiʻula Small Boat Harbor is located on the southern coast of Kauaʻi, approximately 12 miles southwest of Līhuʻe. This seven-acre facility has a 15-foot single lane ramp and ten moorings.

3.4.3.4 Wastewater Treatment and Disposal

Wastewater treatment varies from community to community. The County operates four wastewater systems (these serve Waimea, Hanapēpē-'Eleʻele, Līhuʻe-Hanamāʻulu, and the Kūhiō Highway corridor between Wailua and Kapaʻa. Other communities and larger developments have private treatment systems; and many residents and businesses rely on Individual Wastewater Systems (IWSs) – i.e., cesspools and septic tank systems. The State DOH regulates the operations of both County and private wastewater systems.

The County-operated wastewater treatment systems serve only one-fifth of the residents and visitors on the island. The others are served by more than 30 private wastewater collection and treatment systems operated by small and large individual developments, such as Kauaʻi Community College, the Hyatt Regency Hotel, Lāwaʻi Beach Resort, and Outrigger Kauaʻi Beach. Owners of large

master-planned developments have formed private utility companies to operate collection, treatment and disposal systems in Princeville, Puakea-Puhi, and Kukuiʻula. Princeville operates a system serving the entire Princeville community. In addition, some hotels, apartment complexes and businesses operate package treatment systems primarily serving their own properties.

3.4.3.5 Solid Waste Collection and Disposal

The County plays the primary role in solid waste management on Kauaʻi. It provides direct service to the public by collecting solid waste and operating facilities and programs for reuse and disposal. With the exception of hazardous materials, the County is also responsible for regulating the disposal of solid waste. County solid waste facilities and services are administered by the Road Construction and Maintenance Division of the Department of Public Works.

The largest facility is the Kekaha Landfill. Phase II of this facility began operation in 1993 and is the primary disposal site for solid waste on Kauaʻi. This facility also serves as a drop-off point for segregated recoverable waste. Based on the limited capacity remaining in the current landfill property at Kekaha, it is anticipated that a new Landfill will be needed by January 2017, and it is in the process of selecting a site for a new landfill. In addition to the landfill, the County operates refuse transfer stations located in Hanalei, Kapaʻa, Līhuʻe, and Hanapēpē. Kauaʻi County also encourages neighborhood recycling and has established a number of sites that receive newspaper, glass, aluminum, and paper products. Private contractors are responsible for providing the containers, hauling the materials, and servicing the site.

3.4.4 PUBLIC SERVICES

3.4.4.1 Public Safety

3.4.4.1.1 Police

The Kauaʻi Police Department has three stations, located approximately 25 miles apart. The main station and administrative headquarters is in Līhuʻe. Smaller stations at Waimea and Hanalei are co-located with fire stations.

3.4.4.1.2 Fire

The County has a unified, island-wide system of fire protection and rescue services. The Kauaʻi Fire Department has a main station and administrative headquarters in Līhuʻe. Other fire stations are located in Waimea, Hanapēpē, Kalāheo, Kōloa, Kapaʻa, and Hanalei.

3.4.5 MEDICAL SERVICES

Wilcox Memorial Hospital, located in Līhuʻe, is the island's largest hospital. As part of Hawaiʻi Pacific Health (which also owns and operates Straub and Kapi'olani Hospitals on Oʻahu), Wilcox Memorial Hospital (and its associated clinic) provide a full range of medical services. West Kauai Medical Center is a full-service critical access hospital and primary care clinic located in Waimea. Services include 24-hour emergency services.

3.4.6 EDUCATIONAL FACILITIES

The State of Hawaiʻi operates the public education system on the island. This is supplemented by a network of private schools.

3.4.7 RECREATIONAL FACILITIES

The County of Kauaʻi operates and maintains nearly 70 active park and recreational facilities on the island, and these occupy a total of nearly 500 acres. These facilities range from tennis courts (many of them lighted, to beach parks, to active sports fields. The tennis courts are located at Kapaʻa New Park, Wailua Homesteads Park, Wailua Houselots Park, Līhuʻe County Park, Puhi Park, Kōloa Park, Kalawai Park, Hanapēpē Park, Waimea High School, and Kekaha Park.

3.4.8 SCENIC RESOURCES

The Kaua‘i County General Plan notes that the island is known for the beauty and the great variety of its landscape and that the native Hawaiian culture is intimately linked to physical places, many of which have a special significance in relation to a particular god, legend, song, or historical occurrence. It further notes that these land features, some of which can be seen from many places around the island, attract visitors to Kaua‘i and therefore have substantial economic value. Because of its island-wide nature, the facilities that make up KIUC’s system are ubiquitous and (as can be seen by comparing the transmission and distribution system map with the heritage resource maps contained in the Kaua‘i General Plan) affect many scenic views and other visual resources.

3.4.9 LAND USE AND LAND USE CONTROLS

3.4.9.1 Existing Land Use

KIUC’s facilities are intermixed with every type of land use present on the island. They cross or are adjacent to residential, industrial, commercial, and agricultural uses and development. Its electrical transmission and distribution lines run through conservation areas as well as dense urban development.

3.4.10 EXISTING POLICIES AND LAND USE PLANS

3.4.10.1.1 Hawai‘i State Plan

The Hawai‘i State Plan is a policy document intended to guide the long-range development of the State of Hawai‘i by: identifying goals, objectives, and policies for the State of Hawai‘i and its residents; establishing a basis for determining priorities and allocating resources; and providing a unifying vision to enable coordination between the various counties’ plans, programs, policies, projects and regulatory activities to assist them in developing their county plans, programs, and projects and the State’s long-range development objectives. The Hawai‘i State Plan is dependent upon implementing laws and regulations to achieve its goals.

3.4.10.1.2 State of Hawai‘i Land Use Law

Under The State Land Use Law (Act 187), Hawai‘i Revised Statute Chapter 205, all lands and waters in the State are classified into one of four districts: Agriculture, Rural, Conservation, or Urban. Conservation Districts, under the jurisdiction of DLNR, are further divided into five subzones: Protective, Limited, Resource, General, and Special (Hawai‘i Administration Rules, Title 13, Chapter 5). KIUC facilities and activities take place in all four State Land Use districts.

3.4.10.1.3 Hawai‘i’s Coastal Zone Management (CZM) Program

Hawai‘i’s Coastal Zone Management (CZM) Program (HRS 205A-2) is designed to protect valuable and vulnerable coastal resources by reducing coastal hazards and improving the review process for activities proposed within the coastal zone. The CZM program also includes a permit system to control development within Special Management Areas (SMAs), which include lands within 300 ft (91 m) from the shoreline.

3.4.10.1.4 Kaua‘i County General Plan

Chapter 46 of the HRS grants the counties certain powers and responsibilities. Among them is the power to regulate land development through zoning in accordance with a general plan. HRS §46-4 states in part:

> *Zoning in all counties shall be accomplished within the framework of a long range, comprehensive general plan prepared . . . to guide the overall future development of the county. Zoning shall be one of the tools available to the county to put the general plan into effect in an orderly manner.*

Article 14 of the County Charter states that the Planning Director shall prepare a general plan; that the Planning Commission shall review the general plan and shall transmit it with the Commission’s

recommendations through the Mayor to the County Council; and, finally, that the County Council shall adopt the general plan by ordinance. The Kaua'i County General Plan (last updated in 2000) provides guidance for land use regulations, the location and character of new development and facilities, and planning for County and State facilities and services. The General Plan states the County's 20-year vision for Kaua'i and sets policies for achieving that vision. The General Plan is a direction-setting, policy document; it is not intended to be regulatory in the sense of a zoning code or other land use regulation. The policies are intended to guide County decision-making by mapping the direction of future development; by describing what kind of future development is desirable; and by setting priorities for public improvements. The General Plan also establishes a framework and priorities for future community-level planning and long-range planning for public facilities.

3.4.10.1.5 County Zoning

Chapter 8 of the Kaua'i County Code contains the comprehensive zoning ordinance that is one of the principal means of implementing the Kaua'i County General Plan. It provides standards and regulations for land development and the construction of buildings and other structures in the County. It establishes several land districts and delineates the respective types of permitted uses and development that can take place in those districts.[33] Electrical utility uses and structures are permitted uses in some zoning districts and require special approval in others. For example, Sec. 8-7.3(11) lists "Private and public utility facilities" as uses and structures that require a use permit in the Agricultural District. Similar approval is required in the "Open District".

[33] Sec. 8-l.4 (d) of the regulations states: "Nothing in this Chapter shall regulate the placement, design and construction of utility poles, towers and transmission lines by a public utility company as defined in Section 269-l, H.R.S., provided, that the poles and towers shall be no higher than twenty (20) feet above the height limits for structures applicable in the Use District in which the poles and towers are constructed." For the purpose of the CZO, "Utility Facility" means a use or structure used directly in distribution or transmission of utility services. And "Utility Line" means the conduit, wire or pipe employed to conduct water, gas, electricity or other commodity from the source tank or facility for reduction of pressure or voltage or any other installation, employed to facilitate distribution. The CZO does not regulate the minimum size of lots in a subdivision which are to be used for government or public utility facilities, but they must be in accordance with Chapter 9 of the Code, County Subdivision Ordinance.

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4.0 POTENTIAL IMPACTS AND MITIGATION

This chapter discusses potential impacts to the affected environment as a result of the No-Action Alternative (see Section 4.1), the Proposed Action (see Section 4.2) and the Alternative Permit Term (see Section 4.3). In addition to the expected direct and indirect environmental effects, cumulative impacts are also addressed. When applicable, avoidance, minimization, and mitigation measures are discussed.

4.1 IMPACTS OF THE NO-ACTION ALTERNATIVE

NEPA requires agencies to describe and analyze a "No-Action Alternative", i.e., what would happen if the agency did not act upon the proposal for agency action. In the present case, under the No-Action Alternative (non-issuance of an ITP by USFWS), KIUC could not legally construct any new facilities that would cause take of endangered species, (although as a public utility KIUC would presumably continue to operate its existing facilities without an ITP).[34] As a result of the plea agreement between KIUC and DOJ, the power line reconfiguration projects included as minimization measures in the Proposed Action, except for segments H-3 and H-4 in Table 2.4, will also occur under the No-Action Alternative. The analyses of the impacts of those projects are included in the analyses of the Proposed Action, and not duplicated here.

It is USFWS' understanding that if KIUC did not construct new power generation or transmission/ distribution facilities that would cause take of endangered species, it might not be able to provide sufficient power to meet its customers' needs. Therefore, this alternative would result in the unauthorized take of listed species if KIUC does not obtain an ITP via a different HCP application, and thus would not be legal. KIUC is regulated by the State of Hawai'i PUC. One of the obligations it assumed when the PUC granted the cooperative a Certificate of Public Convenience and Necessity authorizing its operation was to provide service to all those within its service area who request it (see, for example, page 13 of PUC Decision and Order No. 14859, filed August 7, 1996). In practical terms, this means that if a potential customer approaches with a request for new service or if an existing customer increases its use of electricity, then KIUC must satisfy the request. This makes it unlike most business entities, which are free to deny service if they so choose. It also prevents it from deciding of its own volition not to install and operate the facilities needed to provide that service.

If KIUC does not obtain an ITP by the end of the 18-month probationary period provided under the plea agreement, therefore, selection of this alternative would mean that unauthorized take of listed species from ongoing operations and maintenance would continue.

4.1.1 PHYSICAL ENVIRONMENT IMPACTS OF THE NO ACTION ALTERNATIVE

Under the no action scenario, no direct adverse impacts to the physical environment would be expected other than those resulting from actions KIUC would choose to implement on their own, and would be as described in the Proposed Action. This includes geology, soils, hydrology, drainage, water features, air quality, noise, scenic resources, and land use.

4.1.2 BIOLOGICAL IMPACTS OF THE NO-ACTION ALTERNATIVE

Under the No-Action Alternative, KIUC would not erect any new structures that have the potential to cause incidental take of the Covered Species. However, this scenario also would not provide the benefits to the Covered Species expected under the Proposed Action or Alternative Permit Term Alternative because proposed mitigation measures outlined in the HCP would not be implemented. This alternative would not contribute to recovery efforts, research, or habitat protection for the Covered Species if KIUC does not undertake the mitigation measures included in the HCP. As a

[34] Under this alternative, any "take" of the Covered Species by these KIUC facilities or related operations would be unauthorized.

result of the plea agreement between KIUC and DOJ, all of the power line reconfiguration projects included as minimization measures in the Proposed Action, except for segments H-3 and H-4 (see Table 2.4), also would occur under the No-Action Alternative.

If the ITP is not issued, the anticipated annual incidental take described in the HCP, that includes take of up to 180 Newell's shearwater, 2 Hawaiian petrel, and 2 band-rumped storm-petrel, will still occur. However, there may be less take occurring as KIUC implements the power line reconfiguration projects that are expected to reduce collision risks. It is estimated that as many as 19 of the 70 subadult and adult Newell's shearwater thought to collide with KIUC's power lines annually occur in the segments that will be reconfigured. The reduction of collision risk to the Hawaiian petrel or to the band-rumped storm-petrel cannot be quantified but it is expected that the benefits will apply equally to these species as to Newell's shearwater. The estimated ongoing annual take of 87 adult Newell's shearwaters represents 0.46 percent of the 18,900 adults estimated to use the island. The indirect loss of 18 chicks/eggs represents impacts to 0.5 percent of the estimated 3,300 eggs laid by breeding pairs on Kauaʻi annually. The authorization of the death or injury to 72 fledglings represents impacts to 3.3 percent of the 2,173 Newell's shearwater that are estimated to fledge annually on Kauaʻi. Based on the estimated survival rate of Newell's shearwater from fledgling to breeding age of 0.333 (Ainley et al. 2001), approximately 24 of those 72 fledglings would have survived until adulthood.

As part of KIUC's plea agreement, KIUC agreed to establish an escrow account of $50,000 to be used to mitigate for the take of any protected seabirds by KIUC's power lines or lights until the end of their 18-month probationary period in June, 2012. A process was established where for each bird proven to be taken by a KIUC power line or light and not successfully rehabilitated by SOS, KIUC must transfer $10,000 to NFWF for use in mitigating takings of seabirds on Kauaʻi, whereas birds proven to be taken by some other entity and rehabilitated by SOS using KIUC funding will result in $1,000 offset to the account. KIUC has also agreed to replenish the escrow account as it is used, up to a total of $200,000. Any funds remaining in the escrow account at the end of the probationary period will be returned to KIUC.

Under the No-Action Alternative, KIUC would not undertake the mitigation measures included in the proposed HCP, and the decline in the population of Newell's shearwater documented by studies by Ainley et al. (2001) and Day et al. (2003a) would likely continue. Under this alternative, DOFAW would continue to develop the island-wide seabird HCP. Both DOFAW and USFWS would continue to provide KIUC technical assistance in anticipation of its participation in the KSHCP.

As part of its plea agreement, KIUC agreed to donate $225,000 to the National Fish and Wildlife Foundation (NFWF) to be placed into an account for use to benefit and increase the population of Newell's shearwater on Kauaʻi. However, these funds may not be used for any of the mitigation measures included in the KIUC Short-term Seabird HCP. The NFWF account also contains $180,000 that was donated by the County of Kauaʻi under its own plea agreement with DOJ. The interagency seabird working group is developing project proposals in anticipation of applying for those funds.

While NTBG seeks to obtain donations to implement some predator control in the Upper Limahuli Valley, under the No-Action Alternative, the success of the project in decreasing mortality and increasing reproduction of the Covered Species would be greatly diminished compared to the Proposed Action. To date, NTBG has not obtained sufficient funds to implement a year-long predator control program. The work in other colonies that are proposed as part of the HCP would not occur unless/until alternate funding is found. Some surveys for additional nesting colonies of Covered Species would likely be conducted by DOFAW, but at a diminished level. The analysis of the NOAA at-sea survey data would not occur unless/until alternate funding is found.

Under the No-Action Alternative, KIUC would continue to determine on an annual basis whether to voluntarily support the Save Our Shearwaters (SOS) program (described in Section 2.2.3.3.1) as it has since 2005. Given its history of support, it is assumed that KIUC would continue to fund the SOS Program. If, however, in the unlikely event KIUC chooses not to continue implementing the

program, the SOS Program would likely return to being implemented by DOFAW. Under DOFAW, the program would rely on available staff or volunteers to maintain the aid stations and release the birds placed in them and would not be implemented according to the SOS Operations Manual (Appendix C in the proposed HCP). The rehabilitation efforts currently conducted by the Kauai Humane Society using KIUC funds would not likely continue. Even though the focus of the SOS Program is on recovery of Covered Species, the program also retrieves additional species, such as wedge-tailed shearwater (*Puffinus pacificus*) and white-tailed tropicbirds (*Phaethon lepturus*), but there is no information that KIUC facilities are causing these impacts. However, KIUC's proposed support of the SOS Program will provide benefits to these species through the collection, rehabilitation and release of live individuals of these species. While the benefits of such actions cannot be quantified, they are expected to be similar as those to the Covered Species. Should KIUC not fund the SOS Program, non-Covered Species would still be collected and released if possible under the direction of DOFAW. The proposed colony management mitigation actions that accompany the Proposed Action as outlined in the HCP are planned to compensate for adverse impacts to listed species. Some of these measures under the Proposed Action and Alternative Permit Term Alternative also have the potential to benefit some non-listed species by decreasing their risk of predation by introduced mammals (e.g., rats, cats, and dogs); these would not be realized under the No-Action Alternative. Therefore, while no additional impacts to non-listed wildlife are expected under the No-Action Alternative, this scenario could be less beneficial to non-listed species, and more beneficial to introduced species of mammals, relative to the Proposed Action or Alternative Permit Term Alternative.

4.1.3 SOCIOECONOMIC AND CULTURAL IMPACTS OF THE NO-ACTION ALTERNATIVE

4.1.3.1 Socioeconomic Impacts of the No-Action Alternative

To the extent that KIUC is unable to provide service to new customers who request it or to provide additional energy requested by existing customers, economic activity that would otherwise occur would likely be forestalled. It would restrict economic development by effectively precluding construction of new public and private projects that would require the installation and operation of new electrical generation facilities and/or new transmission infrastructure. It would also restrict the development of community infrastructure improvements (e.g., road widening projects, or new road projects) and new community benefit projects (e.g., new community centers and recreational facilities) for the same reason.

4.1.3.2 Cultural and Archaeological Resources

No impacts to cultural or archaeological resources are expected under the No-Action Alternative.

4.1.4 INFRASTRUCTURE IMPACTS OF THE NO-ACTION ALTERNATIVE

4.1.4.1 Utilities and Public Services

No change in utilities or public services would be expected under the No-Action Alternative. The lack of utility extensions has the potential to preclude development that might otherwise occur.

4.1.4.2 Roadways

No impacts to traffic or transportation infrastructure would occur under the No-Action Alternative.

4.1.5 CUMULATIVE IMPACTS OF THE NO-ACTION ALTERNATIVE

The No-Action Alternative would not cause any change to the existing environment beyond the power line reconfiguration projects KIUC committed to implement under its plea agreement with DOJ. The impacts of the power line reconfiguration projects included in the No-Action Alternative (all except segments H-3 and H-4 in Table 2.4) are analyzed below in Section 4.2. None of the projects are expected to cause significant impacts to the human environment. Therefore, would not cumulatively contribute to a change in the status of any of the natural or human factors addressed in this EA. Under this scenario, the status quo would be maintained plus the elements of the plea

agreement will be implemented. It is likely that take of listed species would continue to occur. Moreover, while KIUC would implement the power line reconfiguration projects under the terms of its plea agreement, it will not provide mitigation for potential impacts to the Covered Species beyond any efforts that could be funded using the escrow account established under the agreement. As such, there would be no cumulative contribution toward regional conservation and recovery of threatened and endangered species.

4.2 IMPACTS OF THE PROPOSED ACTION

The Proposed Action is issuance of the ITP for the existing and certain future KIUC activities and facilities. Issuance of the ITP and approval of an HCP that meets the criteria set forth in Section 10(a)(2)(B) of the ESA would allow for fulfillment of KIUC's basic purpose of continuing to operate its existing and immediately needed facilities. Mitigation measures for activities expected to, or with potential to, adversely impact environmental resources are also discussed. KIUC coordinated with biologists from USFWS, DLNR-DOFAW, USGS, and members of the ESRC to identify and select appropriate mitigation measures.

This document addresses all impacts to the human environment due to the limited additional (i. e., new) facilities and activities. However, for existing facilities only the impacts to Covered Species are analyzed because these all would have continuing unauthorized impacts to Covered Species should no ITP be issued. The discussion is organized by impact topic (e.g., impact on soil resources, impact on hydrologic resources, impact on biological resources, etc.). The discussion within each impact topic is divided into two parts. The first discusses the potential effects of the additional electric power generation and distribution facilities and operations that KIUC plans to undertake within the term of the permit and ITP/HCP; the second discusses the impacts of the mitigation measures that KIUC is proposing to implement as part of its HCP.

Because the funding of an update of at-sea population estimates (Section 2.2.3.3.4) only involves analyses of previously collected data and has no potential to affect the human environment, it is not analyzed further.

Should the HCP continue into Years 4 and 5, the same kinds of activities would occur in Wainiha Valley as those described above for Limahuli Valley and Hono O Nā Pali. As the environment in Wainiha is similar to that in Limahuli Valley and Hono O Nā Pali, potential impacts from such actions, e.g., invasive species control, vehicle use, etc., are not anticipated to be different from the actions implemented there. Once the mitigation actions are identified, if any additional impacts are expected, a supplemental EA will be prepared prior to implementation. The implementation of DOFAW'S existing annual radar studies that is proposed for Year 4 represents a continuation of existing activities whose effects have been previously assessed. Consequently, this EA does not discuss them separately.

4.2.1 IMPACTS ON TOPOGRAPHY AND SOILS

4.2.1.1 Impact of Additional Operations on Topography and Soils

Facilities and activities in each of the two categories for which ITP coverage is being sought are discussed in detail below.

4.2.1.1.1 Impact of Future Additional Minor Facilities on Topography and Soils

As discussed below, the additional minor facilities that KIUC would develop over the term of the ITP do not have the potential to affect topography or soils substantially.

- *New Connections within Existing Service Areas (<1,320 feet).* Approximately 75 percent of new connections within existing service areas can be satisfied by installing 50 to 125 feet of new wire from an existing pole or line to the customer's meter. These do not involve any change to topography or soil disturbance. The remaining requests typically require installation of one to three

poles, with holes being drilled to a depth of 4-5 feet. This work disturbs only a few square feet per pole and is typically done in areas that have already been disturbed for other purposes.

- *Electrical Equipment Additions to Existing Substations and Switchyards*. This typically involves work on equipment that is above grade on existing foundations, within existing structures, and or on previously disturbed areas that have a gravel base course already in place. Hence, it does not have the potential to affect topography and soils.
- *Minor Generating Station Equipment and Structure Additions*. The mechanical and electrical equipment that this involves is typically either above grade on existing foundations, within existing structures, or on previously disturbed areas that have a gravel base course already in place. Occasionally it entails low structures containing space for storage (e.g., warehouses), offices, training, and other utility related activities. Some of these may involve a few, low-intensity outdoor lights, but these will be fully shielded and used only when needed. Most of these would have no effect on topography or soils. Those that might (e.g. where a warehouse extension involves minor grading) are so small in scale that they would not substantially alter the existing terrain or soil cover, particularly as they would be constructed in accordance with approved grading and construction plans.
- *Voltage Upgrade on Existing Poles*. Energizing the system at 69 kV rather than the existing 57 kV does not have the potential to affect soils or topography.
- *Installation of Shielded Street Lights*. Installing additional streetlights on KIUC-owned poles in response to government and private requests does not have the potential to affect topography or soils.
- *Fiberoptic Cable Installation*. The installation of fiberoptic cable on existing poles does not have the potential to affect topography or soils.
- *In-situ Replacement of Existing Lines or Other Facilities*. This maintenance activity does not involve work with the potential to affect soils or topography.

4.2.1.1.2 Impact of Larger, Planned, Short-Term Projects on Topography and Soils

As discussed below, none of the more substantial facilities that KIUC would develop over the term of the ITP have the potential to affect topography or soils substantially.

- *Aepo Substation*. The new electrical substation will be located on vacant/unused land adjacent to an existing field road and next to a 69kV overhead transmission line. The substation site is surrounded on all sides by fallow agricultural lands within the McBryde agricultural park. Minor grading of the gently sloping site will be required but would not alter the overall topography. Use of the area would prevent future agricultural use of the soil, but none presently exist or appear likely to occur in the foreseeable future. The presence of the substation will remove a small area (~1 acre) from potential cultivation; however it will not interfere with agricultural uses of the surrounding land. The substation will not affect irrigation facilities, accessibility, or other factors that might compromise the productivity of surrounding soils.
- *North Shore Reliability Enhancement Project*. Most of the work associated with this project entails the reconfiguration of wires on existing poles, the movement of existing poles from one location to another, and the addition of power lines to the side of the existing bridge over the Kalihiwai River. None of these activities would have a substantial effect on topography or soil resources. Short segments of line on the approaches to the bridge and on the approaches to the existing Princeville substation would be placed underground. The trenching for this will temporarily increase the potential for soil erosion/loss, but standard construction Best Management Practices (BMPs) as recommended by the Clean Water Branch of the State of Hawai‘i Department of Health will be used to minimize this to an insignificant level.
- *Kapaia Power Station Generation Addition*. The contemplated plant addition is within the boundaries of an existing power plant on land that was approved for that purpose at the beginning

of this decade. The changes to the switchyard are to equipment only. These changes would be limited to already-disturbed areas that have been graded for the purpose. No substantial changes to topography or soil resources would result.

4.2.1.2 Impact of Proposed Mitigation and Minimization Measures on Topography and Soils

The minimization and mitigation measures that KIUC has proposed as part of its HCP are described in Section 2.2.1.5. Their effect on topography and soils are summarized below.

4.2.1.2.1 Implementation of SOS Program

The SOS+ Program does not include any activities that have the potential to affect topography or soil resources.

4.2.1.2.2 Seabird Colony Management and Predator Control

While the invasive plant and animal control activities that would be implemented within the Upper Limahuli Valley as a result of ITP issuance may have temporary impacts to topography and soils due to trampling and reduction in the vegetative cover of non-native species, a corresponding increase in the cover of native species will result in reduced erosion (Vitousek 1993). The NTBG will be able to minimize negative impacts because selected non-native vegetation will be removed, large areas will not be cleared, and soil will not be exposed as a result of the proposed activities. Soil will not be exposed in the establishment of low-impact helicopter landing zones, placement of weather stations, therefore no increase in soil erosion is expected as a result of the installation of these features. During the construction of the storage/camp shelters a small amount of bare soil may be exposed to erosion. The NTBG will mitigate this impact by locating and constructing the shelters in level areas where a lack of slope will reduce the amount of erosion and the potential for sedimentation.

Invasive plant removal and predator control measures (i.e., cat trapping, rat bating, owl removal) within Hono O Nā Pali will cause minor temporary impacts to topography and soils similar to that in Limahuli.

Should the HCP continue into Years 4 and 5, the same kinds of activities would occur in Wainiha Valley as those described above for Limahuli Valley and Hono O Nā Pali. As the environment in Wainiha is similar to that in Limahuli Valley and Hono O Nā Pali, the effects of these activities are expected to be similar as well.

4.2.1.2.3 Auditory Survey to Locate Additional Seabird Breeding Colonies

Some impacts to topography and soil resources may occur due to trampling by surveyors during searches for additional seabird colonies, but impacts will be minimal and insignificant because repeat visits to the same locations will be limited.

4.2.1.2.4 Development and Implementation of Appropriate Underline Monitoring Program

Some impacts to topography and soil resources may occur due to trampling by monitors during searches beneath power lines, but impacts will be minimal and insignificant because repeat visits to the same locations will be limited.

4.2.1.2.5 Reconfigure Existing Overhead Electrical Power Lines at Selected Locations

In some areas the proposed reconfigurations involve both rearranging overhead wires and moving the 12 kV circuit and communications lines underground. In other areas the reconfiguration is limited to modifications to overhead wires. As indicated in Table 4.1, none of these changes would affect topography or soils.

Table 4.1. Potential Effects of Reconfiguration on Topography and Soils.

Area	Length	Relevant Component	Potential Effects on Topography and Soils
Keālia	4,600 ft.	Reconfiguring wires on Poles	Reconfiguration of electrical wires on poles does not entail any change in topography or disturbance/interference with use of soils.
Keālia	340 ft.	Keālia Bridge	Attaching 12 kV and telecommunications lines to bridge does not entail any change in topography or disturbance/interference with use of soils.
Keālia	3,300 ft.	Relocating Poles and Trenching	No grading or other substantial earthmoving is needed. Short term, minor impacts to topography and soils are anticipated due to the removal of existing poles and installation of trench and conduits for underground electrical and communication lines
Hanapēpē Port Allen Side of Hanapepe River	700 ft.	Segment H-3. Lowering transmission wires.	Lowering the dual circuit of transmission approximately 15 feet does not entail any change in topography or disturbance/interference with use of soils.
Hanapēpē River to Intersection of Lele Rd.	1,800 ft.	Segment H-4. Lowering transmission wires.	Lowering the power lines approximately 15 feet does not entail any change in topography or disturbance/interference with use of soils.
Hanapēpē Town Bridge	500 ft.	Segment H-7. Lowering distribution circuit wires.	Lowering distribution (12 kV) conductors does not entail any change in topography or disturbance/interference with use of soils.
Kapaʻa	2,640 ft.	Segment C1. Lowering and flattening 12kV Circuit	Altering the configuration of the power lines does not entail any change in topography or disturbance/interference with use of soils.
Kapaʻa	130 ft.	Segment C2. Attaching 12kV circuit & Telecomm to Bridge	Attaching the 12kV circuit to the bridge does not entail any change in topography or disturbance/interference with use of soils.

4.2.2 HYDROLOGIC IMPACTS

4.2.2.1 Impact of Additional Operations on Hydrology and Hydrologic Resources

Facilities and activities in each of the two categories of additional facilities for which ITP coverage is being sought are discussed in detail below.

4.2.2.1.1 Impact of Future Additional Minor Facilities on Hydrology and Hydrologic Resources

As discussed below, the additional minor facilities that KIUC would develop over the term of the ITP do not have the potential to affect hydrology or hydrologic resources substantially.

- *New Connections within Existing Service Areas (<1,320 feet)*. Approximately 75 percent of new connections within existing service areas can be satisfied by installing 50 to 125 feet of new wire from an existing pole or line to the customer's meter. These do not involve any change to topography or soil disturbance. The remaining requests typically require installation of one to three poles, with holes being drilled to a depth of 4-5 feet. This work disturbs only a few square feet per pole and is typically done in areas that have already been disturbed for other purposes. It does not alter drainage patterns, decrease groundwater recharge, or affect flooding.
- *Electrical Equipment Additions to Existing Substations and Switchyards*. This typically involves work on equipment that is above grade on existing foundations, within existing structures, and or on areas that have a gravel base course already in place. Hence, it does not have the potential to alter drainage patterns, decrease groundwater recharge, or affect flooding.

- *Minor Generating Station Equipment and Structure Additions*. The mechanical and electrical equipment that this involves is typically either above grade on existing foundations, within existing structures, or on areas that have a gravel base course already in place. Occasionally it entails low structures containing space for storage (e.g., warehouses), offices, training, and other utility related activities. Most of these would have no effect on topography or soils. Those that might (e.g. where a warehouse extension involves minor grading) are so small in scale that they would not substantially alter the existing terrain or soil cover, particularly as they would be constructed in accordance with approved grading and construction plans.
- *Voltage Upgrade on Existing Poles*. Energizing the system at 69 kV rather than the existing 57 kV does not have the potential to affect hydrology or hydrologic resources.
- *Installation of Shielded Street Lights*. Installing additional streetlights on KIUC-owned poles in response to government and private requests does not have the potential to affect hydrology or hydrologic resources.
- *Fiberoptic Cable Installation*. The installation of fiberoptic cable on existing poles does not have the potential to affect hydrology or hydrologic resources.
- *In-situ Replacement of Existing Lines or Other Facilities*. This maintenance activity does not involve work with the potential to affect hydrology or hydrologic resources.

4.2.2.1.2 Impact of Larger, Planned, Short-Term Projects on Hydrology and Hydrologic Resources

As discussed below, none of the more substantial facilities that KIUC would develop over the term of the ITP have the potential to affect hydrology or hydrologic resources substantially.

Aepo Substation. The new electrical substation will be located on vacant/unused land adjacent to an existing field road and next to a 69kV overhead transmission line. Minor grading of the gently sloping site will be required but would not alter the overall drainage pattern (the site will be graded so that runoff from the surrounding fields flows around it). Because of the permeable nature of most of the gravel-coated substation area, most of the rain falling on the site itself will percolate into the ground; hence, construction and maintenance of the substation would not increase runoff, and any effect on the quality of the runoff (e.g., change in the amount of suspended sediment) would likely be positive (i.e., fewer pollutants in the runoff than under present conditions). The following general construction management techniques will be followed to reduce impacts to hydrology, drainage, and water features.

- Clearing and grubbing will be held to the minimum necessary for grading, access and equipment operation.
- Erosion and sediment control measures will be in place prior to initiating earth moving activities. Functionality will be maintained throughout the construction period.
- Existing vegetative ground cover will not be disturbed more than 20 days prior to scheduled construction work.
- Construction will be sequenced to minimize the exposure time of the cleared surface area.
- Temporary soil stabilization measures will be used on disturbed areas remaining exposed for more than 30 days.
- Disturbed areas will be protected and stabilized prior to initiating new disturbance.
- Control measures (i.e., silt fences, sand bag barriers, sediment traps, geotextile mats, and other measures intended for soil/sediment trapping) will be inspected once weekly during dry periods and repaired as necessary.
- Control measures (i.e., silt fences, sand bag barriers, sediment traps, geotextile mats, and other measures intended for soil/sediment trapping) will be inspected and repaired as needed within 24 hours after a rainfall event of 0.5 inches or greater over a 24-hour period. During periods of

prolonged rainfall, daily inspection will occur, unless extended heavy rainfall makes access impossible or hazardous.

- Records for all inspections and repairs will be maintained on site.
- Permanent soil stabilization (i.e., graveling or re-planting of vegetation) will be applied as soon as practical after final grading.

- *North Shore Reliability Enhancement Project*. Most of the work associated with this project entails the reconfiguration of wires on existing poles, the movement of existing poles from one location to another, and the addition of power lines to the side of the existing bridge over the Kalihiwai River. None of these activities would have a substantial effect on hydrology or hydrologic resources. Short segments of line on the approaches to the bridge and on the approaches to the existing Princeville substation would be placed underground. The trenching for this will temporarily increase the potential for soil erosion/loss, but construction BMPs similar to those listed for the Aepo Substation will be used to minimize this. Hence, no substantial hydrologic effects are anticipated.
- *Kapaia Power Station Generation Addition*. The contemplated plant addition is within the boundaries of an existing power plant, and changes to the switchyard are to equipment only. These changes would slightly increase storm runoff and decrease recharge. The existing storm drainage system is designed to accommodate the increase. Hence, no substantial changes to hydrologic resources would result.

  Because the area to be disturbed is over an acre, KIUC would be required to prepare a Notice of Intent for construction-related stormwater runoff pursuant to National Pollutant Discharge Elimination System (NPDES) regulations. The NPDES application would identify potential receiving waters for runoff, quantify the anticipated volume of runoff, and identify BMPs that would be used to prevent pollutants from leaving the site. The project is expected to incorporate the general construction management techniques listed for the Aepo Substation in order to avoid or minimize adverse hydrologic impacts.

4.2.2.2 Impact of Proposed Mitigation & Minimization Measures on Hydrologic Resources

The minimization and mitigation measures that KIUC has proposed as part of its HCP are described in Section 2.2.1.5. Their effect on hydrology and hydrologic resources are summarized below.

4.2.2.2.1 Implementation of SOS Program

The SOS+ Program does not include any activities that have the potential to affect hydrology or hydrologic resources.

4.2.2.2.2 Seabird Colony Management and Predator Control

The specific activities that would be implemented within the Upper Limahuli Valley as a result of ITP issuance have low potential to affect hydrology or hydrologic resources, although the control of invasive plants species and encouragement of native species will likely result in reduced surface water runoff (Vitousek 1993). Predator and ungulate control activities, as well as monitoring efforts could result in impacts to hydrology and hydrologic resources due to trampling by NTBG staff and hunters, but impacts will be minimal and insignificant because repeat visits to the same locations will be limited. The use of herbicides will not result in significant impacts to water quality because they will not be used in close proximity to Limahuli stream and degradation of the stream by pigs will be decreased through this project, thereby improving stream quality. By applying herbicide precisely on freshly cut stumps using low volume medical bottle applicators, or by injecting it into living or frilled trees, NTBG staff will be able to avoid impacting water quality. NTBG has utilized this technique with excellent results in the past, and it is a widely used technique for the control of nonnative woody vegetation in Hawai‘i. Extremely low volumes of herbicide are used with this technique. Only products labeled for forestry applications will be utilized, and all label directions will be followed.

Invasive plant removal and predator control measures (i.e., cat trapping, rat bating, owl removal) within Hono O Nā Pali will have the same minor effect on hydrology or hydrologic resources as the same activities in Limahuli Valley.

Should the HCP continue into Years 4 and 5, the same kinds of activities would occur in Wainiha Valley as those described above for Limahuli Valley and Hono O Nā Pali. As the environment in Wainiha is similar to that in Limahuli Valley and Hono O Nā Pali, the effects of these activities are expected to be similar as well.

4.2.2.2.3 Auditory Survey to Locate Additional Seabird Breeding Colonies

Some impacts to hydrology or hydrologic resources may occur due to trampling by surveyors during searches for additional seabird colonies, but impacts will be minimal and insignificant because repeat visits to the same locations will be limited.

4.2.2.2.4 Development and Implementation of Appropriate Underline Monitoring Program

Some impacts to hydrology or hydrologic resources may occur due to trampling by monitors during searches beneath power lines, but impacts will be minimal and discountable.

4.2.2.2.5 Reconfigure Existing Overhead Electrical Power Lines at Selected Locations

As described in Table 4.2, none of the power line reconfiguration projects that KIUC has proposed has the potential to have a significant effect on hydrologic resources. They do not involve substantial water use, work in streams or the ocean, or activities that, when implemented in accordance with the applicable standards and best management practices, have the potential to degrade water quality.

Table 4.2. Potential Effects of Reconfiguration on Hydrologic Resources.

Area	Length	Relevant Component	Potential Effects on Hydrology/Hydrologic Resources
Keālia	4,600 ft.	Reconfiguring wires on Poles	Reconfiguration of electrical wires on poles does not entail water use or changes in drainage patterns. Neither does it entail ground disturbance that could affect water quality.
Keālia	340 ft.	Keālia Bridge	Attaching 12 kV and telecommunications lines to bridge does not entail any use of or discharge into water. Neither does it require activities which could affect water quality.
Keālia	3,300 ft.	Relocating Poles and Trenching	Trenching required for undergrounding entails groundcover altering activities that briefly expose soil and can increase the potential for erosion/ sedimentation. The use of best management practices minimizes this and is highly effective in the sandy soils present near Kealia.
Hanapēpē Port Allen Side of Hanapepe River	700 ft.	Segment H-3. Lowering transmission wires.	Lowering the dual circuit of transmission does not entail any use water or the discharge of effluent into any water body. Neither does it require activities which could affect water quality
Hanapēpē River to Intersection of Lele Rd.	1,800 ft.	Segment H-4. Lowering transmission wires.	Lowering the power lines does not entail any use water or the discharge of effluent into any water body. Neither does it require activities which could affect water quality
Hanapēpē Town Bridge	500 ft.	Segment H-7. Lowering distribution circuit wires.	Lowering the distribution circuit does not entail any use water or the discharge of effluent into any water body. Neither does it require activities which could affect water quality
Kapa‘a	2,640 ft.	Segment C1. Lowering and flattening 12kV Circuit	Altering the configuration of the power lines does not entail any use water or the discharge of effluent into any water body. Neither does it require activities which could affect water quality
Kapa‘a	130 ft.	Segment C2. Attaching 12kV circuit & Telecomm to Bridge	Attaching the 12kV circuit to the bridge does not entail any use of or discharge into water. Neither does it require activities which could affect water quality.

4.2.3 IMPACTS ON CLIMATE, WEATHER, AND AIR QUALITY

4.2.3.1 Impact of Additional Operations on Climate, Weather, and Air Quality

The effect that facilities and activities in each of the two categories of additional facilities for which ITP coverage is being sought would have on climate, weather, and air quality are summarized below.

4.2.3.1.1 Impact of Future Additional Minor Facilities on Climate, Weather, and Air Quality

As discussed below, the additional minor facilities that KIUC would develop over the term of the ITP do not have the potential to substantially affect climate or weather. All operations require the use of vehicles with fossil-fuel-fired internal combustion engines, resulting in some minimal effects on air quality.

- *New Connections within Existing Service Areas (<1,320 feet).* These do not involve emission of substantial quantities of air pollutants, extensive soil disturbance that could increased particulate matter, or change in land forms that could affect microclimate or weather.
- *Electrical Equipment Additions to Existing Substations and Switchyards*. This typically involves work on equipment that is above grade on existing foundations, within existing structures, and or on areas that have a gravel base course already in place. This does not involve emission of substantial quantities of air pollutants, extensive soil disturbance that could increased particulate matter, or change in land forms that could affect microclimate or weather.
- *Minor Generating Station Equipment and Structure Additions*. The mechanical and electrical equipment that this involves is typically either above grade on existing foundations, within existing structures, or on areas that have a gravel base course already in place. Occasionally it entails low structures containing space for storage (e.g., warehouses), offices, training, and other utility related activities. However, none of these are significant emission sources when operating, and none entail extensive soil disturbance (grading) that would degrade air quality significantly as they would be constructed in accordance with approved grading and construction plans.
- *Voltage Upgrade on Existing Poles*. Energizing the system at 69 kV rather than the existing 57 kV does not have the potential to affect climate, weather, or air quality.
- *Installation of Shielded Street Lights*. Installing additional streetlights on KIUC-owned poles in response to government and private requests does not have the potential to affect climate or weather. Generating electricity to power additional lights would marginally increase the emission of air pollutants if the electricity is derived from the combustion of fossil fuel. However, KIUC's compliance with established State and Federal emission and air quality standards will ensure that the change is not significant.
- *Fiberoptic Cable Installation*. With the exception of low-level emissions during the manufacturing and installation process, the place of fiberoptic cable on existing poles does not have the potential to affect climate, weather, or air quality.
- *In-situ Replacement of Existing Lines or Other Facilities*. With the exception of low-level emissions during the manufacturing and installation process, the in situ/in-kind replacement of existing lines or other small facilities does not have the potential to affect climate, weather, or air quality.

4.2.3.1.2 Impact of Larger, Planned, Short-Term Projects on Climate, Weather, and Air Quality

For reasons explained below, none of the more substantial facilities that KIUC would develop over the term of the ITP have the potential to affect climate or weather. Only one, the addition of a planned and already permitted (by the County) fossil-fuel-fired combustion turbine generating unit at the Kapaia Power Station, has the potential to affect air quality in any substantial way.

- *Aepo Substation.* The new electrical substation will be located on vacant/unused land adjacent to an existing field road and next to a 69kV overhead transmission line. Minor grading of the gently sloping site will be required; this will entail the use of no more than a few (maximum 4-5) pieces of

fossil-fuel-fired construction equipment over a period of several months. With the exception of small amounts of select fill (principally gravel) that will be obtained elsewhere and trucked to the site; earthwork will be balanced on-site. Because the gravel topping of the substation is extremely resistant to wind erosion, few soil particles will escape into the atmosphere once that surface is laid down (within a few months of the start of construction). Ongoing operation of the completed substation will not produce measurable air emissions or involve other changes that could substantially affect the microclimate or weather patterns.

- *North Shore Reliability Enhancement Project*. Most of the work associated with this project entails the reconfiguration of wires on existing poles, the movement of existing poles from one location to another, and the addition of power lines to the side of the existing bridge over the Kalihiwai River. Except for very limited emissions by fossil-fuel-fired construction equipment, this project does not involve any activities with the potential to affect climate, weather or air quality. As no more than a few (maximum four) pieces of motorized equipment are likely to be present in one location at any one time and the area of ground disturbance is small, construction-period emissions are too limited to have a measurable effect on ambient air quality.
- *Kapaia Power Station Generation Addition*. KIUC is proposing to add one 17 MW capacity combustion turbine at the Kapaia Power Station. It must obtain an air permit from the State of Hawai‘i Department of Health as provided for in Hawai‘i Administrative Rules (HAR) §11-61.1 (which is consistent with the Clean Air Act, USC Section 7401, *et seq.*). The proposed unit is within the operational and physical parameters assumed in the EIS assessing the potential effects of full build-out of the Līhu‘e Energy Service Center (the former name for the Kapaia Power Station). The results tabulated in Table 4.4-26 of the *Final EIS for the Lihue Energy Service Center* (Planning Solutions, Inc., 1999) show that the total ambient concentrations of the criteria pollutants would be no more than half the limit set by the strictest State and/or Federal ambient air quality standard. As emissions from the single unit that comprises this proposed project are only a fraction of those assumed for the analysis in the EIS, this project would conform to all applicable emission and ambient air quality standards. If the proposed new unit were to lead the utility to use larger amounts of fossil fuel in its system than is presently the case, KIUC's emissions of CO_2 and other gases that can contribute to global warming would increase, but that is not the case. Instead, electricity from it will be used principally to replace power that would otherwise be generated at existing units whose characteristics make them less efficient at converting fuel into electricity and larger air pollutant emitters. Depending on the scenario, KIUC estimates a possible reduction of 14-28 million pounds of CO_2/year could be realized with the addition.[35,36]

4.2.3.2 Impact of Proposed Mitigation/ Minimization Measures on Climate, Weather, & Air Quality

The minimization and mitigation measures that KIUC has proposed as part of its HCP are described in Section 2.2.1.5. Their effect on climate, weather, and air quality are summarized below.

4.2.3.2.1 Implementation of SOS Program

The only aspect of the SOS Program that has any potential to affect air quality is the operation of the vehicles used to pick up birds that are retrieved from the aid stations located around the island and transport them to release points or, in some cases, the rehabilitation center at the Kaua‘i Humane Society. Emissions from the internal combustion engines that power these vehicles add marginally to

[35] At present, Port Allen's Unit S1 (which has a heat rate of ~17,750 BTU/kWH when operated @ 3MW must be kept operating most of the time in order to provide the inertia KIUC needs to maintain sufficient system inertia to accommodate fluctuations in system load. The availability of the new unit, which has a full load heat rate of ~9,050 BTU/kWh, would allow KIUC to avoid operating S1 at such a low load factor.

[36] This reduction is in part a reflection of KIUC's Strategic Plan, which makes it company policy to significantly exceed Hawai‘i Renewable Portfolio Standard (RPS) by reducing electric power generation sector Greenhouse Gas (GHG) emissions to 1990 levels. Its *2008 Integrated Resource Plan* places an emphasis on no-carbon/low-carbon emission generation additions and substitutions that include direct-fired biomass, hydroelectric units, municipal solid waste, wind, and landfill gas.

the volume of pollutants released on island roadways. The amount is too small to produce a measurable difference in ambient air quality.

4.2.3.2.2 Seabird Colony Management and Predator Control

Only minor impacts to air quality are anticipated due to actions proposed to be implemented in the Upper Limahuli Valley and Hono O Nā Pali, primarily from helicopter flights by fossil-fuel-powered helicopters that will be necessary to transport staff and equipment to the areas.

Should the HCP continue into Years 4 and 5, the same kinds of activities would occur in Wainiha Valley as those described above for Limahuli Valley and Hono O Nā Pali. As the environment in Wainiha is similar to that in Limahuli Valley and Hono O Nā Pali, the effects of these activities would be similar as well.

4.2.3.2.3 Auditory Survey to Locate Additional Seabird Breeding Colonies

The auditory surveys will require the use of vehicles with fossil-fuel-fired internal combustion engines to transport surveyors, but the intensity and duration of the emissions will be very low, resulting in insignificant adverse effects on air quality.

4.2.3.2.4 Development and Implementation of Appropriate Underline Monitoring Program

Monitoring beneath power lines to confirm the number of birds that are being adversely affected will require the use of vehicles with fossil-fuel-fired internal combustion engines to transport monitors, but the intensity and duration of the emissions will be very low, resulting in insignificant adverse effects on air quality.

4.2.3.2.5 Reconfigure Existing Overhead Electrical Power Lines at Selected Locations

As described in Table 4.3, none of the power line reconfiguration projects that KIUC has proposed has the potential to have a significant effect on climate, weather, & air quality.

4.2.4 IMPACTS ON SOUND LEVELS

4.2.4.1 Impact of Additional Operations on Sound Levels

The effects on sound levels of each of the two categories of additional facilities for which ITP coverage is being sought are summarized below.

4.2.4.1.1 Impact of Future Additional Minor Facilities on Sound Levels

As discussed below, the additional minor facilities that KIUC would develop over the term of the ITP require the use of vehicles with fossil-fuel-fired internal combustion engines, resulting in some minimal effects on sound levels.

- *New Connections within Existing Service Areas (<1,320 feet)*. These do not involve the ongoing operation of any equipment or the undertaking of any activities that have the potential to affect sound levels significantly. Low levels of noise can be generated by the trucks and other equipment used to install the lines, but it is not intense and is limited to periods of a few hours.
- *Electrical Equipment Additions to Existing Substations and Switchyards*. This typically involves work on equipment that is above grade on existing foundations, within existing structures, and or on previously disturbed areas that have a gravel base course already in place. This does not involve the operation of any equipment or the undertaking of any activities that have the potential to affect sound levels significantly.
- *Minor Generating Station Equipment and Structure Additions*. The mechanical and electrical equipment that this involves is typically either above grade on existing foundations, within existing structures, or on previously disturbed areas that have a gravel base course already in place. Occasionally it entails low structures containing space for storage (e.g., warehouses), offices, training, and other utility related activities. This does not involve the operation of any equipment or the undertaking of any activities that have the potential to affect sound levels significantly.

Table 4.3. Potential Effects of Power Line Reconfiguration on Climate, Weather, & Air Quality.

Area	Length	Relevant Component	Potential Effects on Climate, Weather, & Air Quality
Keālia	4,600 ft.	Reconfiguring wires on Poles	Reconfiguration of electrical wires on poles entails limited, short-term use of construction equipment that does not have the potential to degrade air quality through emissions from internal combustion engines, fugitive dust, or other means.
Keālia	340 ft.	Keālia Bridge	Attaching 12 kV and telecommunications lines to the bridge and reconfiguration of electrical wires on poles entails limited, short-term use of construction equipment that does not have the potential to degrade air quality through emissions from internal combustion engines, fugitive dust, or other means.
Keālia	3,300 ft.	Relocating Poles and Trenching	Trenching required for undergrounding entails groundcover altering activities that briefly expose soil and can increase the potential for erosion/ sedimentation. The use of best management practices minimizes this and is highly effective in the sandy soils present near Kealia.
Hanapēpē Port Allen Side of Hanapepe River	700 ft.	Segment H-3. Lowering transmission wires.	Lowering the dual circuit of transmission entails limited, short-term use of construction equipment that does not have the potential to degrade air quality through emissions from internal combustion engines, fugitive dust, or other means.
Hanapēpē River to Intersection of Lele Rd.	1,800 ft.	Segment H-4. Lowering transmission wires.	Lowering and flattening the overhead power lines entails limited, short-term use of construction equipment that does not have the potential to degrade air quality through emissions from internal combustion engines, fugitive dust, or other means.
Hanapēpē Town Bridge	500 ft.	Segment H-7. Lowering distribution circuit wires.	Lowering the dual circuit of transmission entails limited, short-term use of construction equipment that does not have the potential to degrade air quality through emissions from internal combustion engines, fugitive dust, or other means.
Kapa‘a	2,640 ft.	Segment C1. Lowering and flattening 12kV Circuit	Lowering and flattening the overhead power lines entails limited, short-term use of construction equipment that does not have the potential to degrade air quality through emissions from internal combustion engines, fugitive dust, or other means.
Kapa‘a	130 ft.	Segment C2. Attaching 12kV circuit & Telecomm to Bridge	Attaching 12 kV and telecommunications lines to bridge entails limited, short-term use of construction equipment that does not have the potential to degrade air quality through emissions from internal combustion engines, fugitive dust, or other means.

- *Voltage Upgrade on Existing Poles*. Energizing the system at 69 kV rather than the existing 57 kV does not involve the operation of any equipment or the undertaking of any activities that have the potential to affect sound levels significantly.
- *Installation of Shielded Street Lights*. Installing additional streetlights on KIUC-owned poles in response to government and private requests does not involve the operation of any equipment or the undertaking of any activities that have the potential to affect sound levels significantly. Generating electricity to power additional lights would marginally increase equipment noise. However, KIUC's compliance with established State noise standards will ensure that the change is not significant.
- *Fiberoptic Cable Installation*. The placement of fiberoptic cable does not involve the operation of any equipment or the undertaking of any activities that have the potential to affect sound levels significantly.
- *In-situ Replacement of Existing Lines or Other Facilities*. The in situ/in-kind replacement of existing lines or other small facilities does not involve the operation of any equipment or the undertaking of any activities that have the potential to affect sound levels significantly.

4.2.4.1.2 Impact of Larger, Planned, Short-Term Projects on Sound Levels

Most of the larger planned facilities that KIUC would develop over the term of the ITP do not have the potential to significantly affect sound levels.

- *Aepo Substation*. The new electrical substation will be located on vacant/unused land adjacent to an existing field road and next to a 69 kV overhead transmission line. Minor grading of the gently sloping site will be required but will entail only limited use of fossil-fuel-fired construction equipment. The equipment at the substation produces only low levels of noise, and the absence of any noise-sensitive neighbors ensures that this will not become a nuisance. It will comply with all applicable noise standards.
- *North Shore Reliability Enhancement Project*. Once operational, all of the facilities will be silent. Hence, only construction noise is of possible concern. Most of the work associated with this project entails the reconfiguration of wires on existing poles, the movement of existing poles from one location to another, and the addition of power lines to the side of the existing bridge over the Kalihiwai River. No use of explosives, rock-drilling, or other unduly loud activities will be needed. Most of the work will be done using bucket-trucks and other equipment commonly used to string electrical cable on utility poles. Sound from this equipment is relatively low (not more than 70 dBA). With the exception of the trenching needed for the underground portion of the project, activity in any one area would be limited to a week or less at a time, and often the line installation and pole reconfiguration can be completed within a few days. Sound from the loudest diesel-powered equipment likely to be used is typically in the range of 70 to 80 dBA at a distance of 100 feet from the noise source, and use of such equipment will be limited to daytime hours, and sound levels decrease further with increasing distance typically at a rate of 6 dBA for each doubling of the distance. The vast majority of the route is more than a thousand feet from the nearest residence or other noise-sensitive land use; fewer than five homes are within 300 feet of the route, and construction noise at those locations would generally be no greater than existing highway traffic noise.
- *Kapaia Power Station Generation Addition*. Construction and operation of the combustion turbine that KIUC proposes to install at its Kapaia Power Station will increase sound levels in the area. The construction period noise will be short-term; in the absence of noise-sensitive neighbors, it does not have the potential for significant adverse effects. Operational noise will be ongoing for the life of the facility. The *Final EIS for the Lihue Energy Service Center* (Planning Solutions, Inc., 1999) analyzed the noise impacts of full build-out of what is now known as the Kapaia Power Station. As discussed in Section 4.11.4.2 of that document, the results of the analysis indicated that noise from the project would be compatible with the continuation of existing uses. As the existing facilities at the Kapaia Power Station and the proposed addition represent only a fraction of the noise source levels on which the EIS' assessment was based, therefore, that noise from KIUC's proposed addition would not have a significant adverse effect.

4.2.4.2 Impact of Proposed Mitigation/ Minimization Measures on Sound Levels

The minimization and mitigation measures that KIUC has proposed as part of its HCP are described in Section 2.2.1.5. Their effect on sound levels are summarized below.

4.2.4.2.1 Implementation of SOS Program

The only aspect of the SOS Program that has any potential to affect sound levels in the community is the operation of the vehicles used to pick up birds that are retrieved from the aid stations located around the island and transport them to release points or, in some cases, the rehabilitation center at the Kaua'i Humane Society. Noise from tires, the internal combustion engines that power these vehicles and other automotive equipment will add marginally to sound levels adjacent to the highways on which these are used. The addition is far too small to produce a measurable difference in noise levels.

4.2.4.2.2 Seabird Colony Management and Predator Control

Flights by fossil-fuel-powered helicopters that will be necessary to transport staff and equipment to the Limahuli Valley and Hono O Nā Pali Natural Area Reserve will temporarily increase noise levels near their flight paths. These flights will be relatively few in number, occur during normal work hours and will not fly over residences or other noise-sensitive resources. Neither this helicopter noise nor noise from other activities from the colony management effort will substantially change sound levels in the affected area.

Should the HCP continue into Years 4 and 5, the same kinds of activities would occur in Wainiha Valley as those described above for Limahuli Valley and Hono O Nā Pali. As the environment in Wainiha is similar to that in Limahuli Valley and Hono O Nā Pali, the effects of these activities would be similar as well.

4.2.4.2.3 Auditory Survey to Locate Additional Seabird Breeding Colonies

The auditory surveys will require the use of vehicles with internal combustion engines to transport surveyors, but the intensity and duration of the noises will be very low, resulting in insignificant adverse effects on sound levels.

4.2.4.2.4 Fund Development and Implementation of Appropriate Underline Monitoring Program

Monitoring beneath power lines to confirm the number of birds that are being adversely affected will require the use of vehicles with internal combustion engines to transport monitors, but the intensity and duration of the noise will be very low, resulting in insignificant adverse effects on sound levels.

4.2.4.2.5 Reconfigure Existing Overhead Electrical Power Lines at Selected Locations

For reasons summarized in Table 4.4, none of the power line reconfiguration projects that KIUC has proposed has the potential to have substantially alter the existing noise environment except during brief periods during construction.

4.2.5 IMPACTS ON FLORA

4.2.5.1 Impact of Additional Operations on Flora

The effects on flora of each of the two categories of additional facilities for which ITP coverage is being sought are summarized below.

4.2.5.1.1 Impact of Future Additional Minor Facilities on Flora

As discussed below, the additional minor KIUC facilities that KIUC would develop over the term of the ITP do not have the potential to affect substantially affect existing flora. In all instances where such projects may impacts native vegetation, KIUC will ensure that no rare or listed species will be affected.

- *New Connections within Existing Service Areas (<1,320 feet)*. These do not involve the operation of any equipment or the undertaking of any activities that require the removal or disturbance of existing flora because such actions only occur in previously disturbed areas.
- *Electrical Equipment Additions to Existing Substations and Switchyards*. This typically involves work on equipment that is above grade on existing foundations, within existing structures, and or on previously disturbed areas that have a gravel base course already in place. This does not involve the operation of any equipment or the undertaking of any activities that have the potential to affect flora.
- *Minor Generating Station Equipment and Structure Additions*. The mechanical and electrical equipment that this involves is typically either above grade on existing foundations, within existing structures, or on previously disturbed areas that have a gravel base course already in place. Occasionally it entails low structures containing space for storage (e.g., warehouses), offices, training, and other utility related activities. This does not involve activities that have the potential to affect flora.

Table 4.4. Potential Effects of Power Line Reconfiguration on Sound Levels.

Area	Length	Relevant Component	Potential Effects on Sound Levels
Keālia	4,600 ft.	Reconfiguring wires on Poles	Reconfiguration of electrical wires on poles entails limited, short-term use of construction equipment. By complying with applicable noise standards, such short-term work (no more than a few days in each location) does not have the potential to generate intrusive noise. Once they are in place, the proposed facilities would not generate noise.
Keālia	340 ft.	Keālia Bridge	Attaching 12 kV and telecommunications lines to the bridge entails limited, short-term use of construction equipment. By complying with applicable noise standards, such short-term work (no more than a few days in each location) does not have the potential to generate intrusive noise. Once they are in place, the proposed facilities would not generate noise.
Keālia	3,300 ft.	Relocating Poles and Trenching	Relocating the poles and trenching involves the use of heavy construction equipment. The great majority of the work will be done well away from noise-sensitive uses. If needed, the construction contractor will obtain a permit as provided for in HAR §11-46. Nighttime use is not anticipated.
Hanapēpē Port Allen Side of Hanapepe River	700 ft.	Segment H-3. Lowering transmission wires.	Lowering the dual circuit of transmission circuit entails limited, short-term use of construction equipment. By complying with applicable noise standards, such short-term work (no more than a few days in each location) does not have the potential to generate intrusive noise. Once they are in place, the proposed facilities would not generate noise.
Hanapēpē River to Intersection of Lele Rd.	1,800 ft.	Segment H-4. Lowering transmission wires.	Reconfiguration of electrical wires on poles entails limited, short-term use of construction equipment. By complying with applicable noise standards, such short-term work (no more than a few days in each location) does not have the potential to generate intrusive noise. Once they are in place, the proposed facilities would not generate noise.
Hanapēpē Town Bridge	500 ft.	Segment H-7. Lowering distribution circuit wires.	Lowering the dual circuit of transmission entails limited, short-term use of construction equipment. By complying with applicable noise standards, such short-term work (no more than a few days in each location) does not have the potential to generate intrusive noise. Once they are in place, the proposed facilities would not generate noise.
Kapaʻa	2,640 ft.	Segment C1. Lowering and flattening 12kV Circuit	Reconfiguration of electrical wires on poles entails limited, short-term use of construction equipment. By complying with applicable noise standards, such short-term work (no more than a few days in each location) does not have the potential to generate intrusive noise. Once they are in place, the proposed facilities would not generate noise.
Kapaʻa	130 ft.	Segment C2. Attaching 12kV circuit & Telecomm to Bridge	Attaching 12 kV electrical and telecommunications wires entails limited, short-term use of construction equipment. By complying with applicable noise standards, such short-term work (no more than a few days in each location) does not have the potential to generate intrusive noise. Once they are in place, the proposed facilities would not generate noise.

- *Voltage Upgrade on Existing Poles*. Energizing the system at 69 kV rather than the existing 57 kV does not involve the operation of any equipment or the undertaking of any activities that have the potential to affect flora.
- *Installation of Shielded Street Lights*. Installing additional streetlights on KIUC-owned poles in response to government and private requests does not involve the operation of any equipment or the undertaking of any activities that have the potential to affect flora.
- *Fiberoptic Cable Installation*. The placement of fiberoptic cable does not involve the operation of any equipment or the undertaking of any activities that have the potential to affect flora.
- *In-situ Replacement of Existing Lines or Other Facilities*. The in situ/in-kind replacement of existing lines or other small facilities does not involve the operation of any equipment or the undertaking of any activities that have the potential to affect flora.

4.2.5.1.2 Impact of Larger, Planned, Short-Term Projects on Flora

For reasons explained below, most of the larger planned facilities that KIUC would develop over the term of the ITP do not have the potential to affect flora.

- *Aepo Substation*. The new electrical substation will be located on vacant/unused land on which sugar cane was cultivated for many years. Minor grading of the gently sloping site will be required, but only common invasive plant species are present. The project will not involve the introduction of new plant species into the area. Neither will it facilitate the spread of invasive plant species or alter vegetation-related fire hazards.
- *North Shore Reliability Enhancement Project*. Most of the work associated with this project entails the reconfiguration of wires on existing poles, the movement of existing poles from one location to another, and the addition of power lines to the side of the existing bridge over the Kalihiwai River. This work will entail the trimming of existing trees within a few stretches of the Kūhiō Highway right-of way near Kalihiwai Stream. Pole relocation may also entail limited removal of landscape and golf course vegetation. None of these changes are expected to be significant.
- *Kapaia Power Station Generation Addition*. Construction and operation of the combustion turbine that KIUC proposes to install at its Kapaia Power Station will involve the use of a portion of the land that has been developed and set aside for the Kapaia Power Station. The site was cultivated in sugar cane, and the vegetation on immediately adjacent areas is comprised of common introduced species (Planning Solutions, Inc., 1999), therefore, impacts to flora will be insignificant.

4.2.5.2 Impact of Proposed Mitigation/ Minimization Measures on Flora

The minimization and mitigation measures that KIUC has proposed as part of its HCP are described in Section 2.2.1.5. Their effects on flora are summarized below.

4.2.5.2.1 Implementation of SOS Program

Operation of the SOS Program does not involve any activities with the potential to affect flora because operations do not involve any actions that cause ground disturbance.

4.2.5.2.2 Seabird Colony Management and Predator Control

Colony management in Limahuli Valley involves actions, primarily control of invasive plant species with the potential to affect existing flora, but all effects should be beneficial. Alien trees and shrubs will be selectively removed from strategic locations. Incipient invaders (i.e., those that still exist in small numbers and have yet to become well established) will be an important focus of the alien plant control program. The basic methodology for this will be the use of a chain saw and/or the use of translocated herbicide that is either painted on the stump, or injected into the trees or shrubs. Alien herbaceous species will be controlled in order to prepare sites for replanting with native species and as needed to maintain selected areas in the future. Herbicides may also be used to prevent the spread of localized incipient invasions of herbaceous species, and then only when this technique has a high probability of controlling the target species. Mechanical control methods will be used preferentially over herbicides. When herbicides are necessary, they will be applied in accordance with label instructions. Herbicides will be applied at the minimum volume and concentration required for control of the target species and will be applied only during periods of dry weather and never when heavy rains are expected. This will virtually eliminate the chance that any harmful chemicals will be transported into Limahuli Stream via runoff from the treated site. The maintenance of Upper Limahuli Preserve will require the continual removal of young alien trees before they reach a mature size. This should become less of a problem as more and more seed-producing alien trees are removed over the years. The long term effects expected from halting the degradation of this native dominant ecosystem is the increased likelihood of a forest 50 years from now that contains more native species diversity and has had fewer species extinctions when compared with nearby unmanaged areas. To reduce the probability that weed seeds are brought to the site, tools, clothes, shoes, backpacks, and materials will be inspected and cleaned before transport. Staff and contractors will maintain dedicated personal gear (shoes, packs, gloves, clothing, etc.) for fence work in intact forest areas.

Invasive plant removal (i.e., mechanical control methods, herbicide) within Hono O Nā Pali will have a beneficial impact on the flora by promoting habitat preservation of the existing seabird colony similar to that of Limahuli Valley and all best management practices will be implemented to ensure any impacts to native flora are minimized.

Should the HCP continue into Years 4 and 5, the same kinds of activities would occur in Wainiha Valley as those described above for Limahuli Valley. As the environment in Wainiha is similar to that in Limahuli Valley and Hono O Nā Pali, the effects of these activities on the flora there would be similar as well.

4.2.5.2.3 Auditory Survey to Locate Additional Seabird Breeding Colonies

Some impacts to flora may occur due to trampling by surveyors during searches for additional seabird colonies, but impacts will be minimal and insignificant because repeat visits to the same locations will be limited and surveyors will be trained in identifying and avoiding impacts to native vegetation.

4.2.5.2.4 Fund Development and Implementation of Appropriate Underline Monitoring Program

Conducting a monitoring program designed to confirm the number of birds that are being adversely affected may involve accessing vegetated areas on foot and may involve vegetation clearing to improve visibility. If clearing is proposed, the monitoring corridor will be surveyed to determine the presence or absence of native plants. Impacts to native species will be avoided if at all possible and any federally-listed species will be completely avoided. Some impacts to flora may occur due to trampling by monitors, but impacts will be minimal and insignificant because repeat visits to the same locations will be limited and monitoring will occur primarily in areas dominated by non-native vegetation.

4.2.5.2.5 Reconfigure Existing Overhead Electrical Power Lines at Selected Locations

For reasons summarized in Table 4.5, none of the power line reconfiguration projects that KIUC has proposed has the potential to have substantially alter existing vegetation.

4.2.6 IMPACTS ON FAUNA

The HCP contains a detailed discussion of the level of take of the Covered Species that would be authorized if an ITP is issued that provides for implementation of the measures that KIUC has proposed. This section begins with a discussion of the probable impacts of the additional facilities that it proposes to initiate during the term of the ITP assuming implementation of the proposed avoidance, minimization, and mitigation measures (see Section 4.2.6.2). This is followed by a review of the effects of its existing facilities/ongoing operation (see Section 4.2.6.4).

4.2.6.1 Impacts on Non-Covered Species

Even though the focus of the SOS Program is on recovery of Covered Species, the program also retrieves additional species, such as wedge-tailed shearwater (*Puffinus pacificus*) and white-tailed tropicbirds (*Phaethon lepturus*), but there is no information that KIUC facilities are causing these impacts. However, KIUC's proposed support of the SOS Program will provide benefits to these species through the collection, rehabilitation and release of live individuals of these species. While the benefits of such actions cannot be quantified, they are expected to be similar as those to the Covered Species. Therefore, the impacts occurring are not significant.

4.2.6.2 Impact of Additional Operations on Covered Species

Because lights attract the Covered Species, KIUC will only conduct work during nighttime hours in emergency situations or when system conditions require nighttime work. If system conditions require non-emergency nighttime work during the autumn fallout season (September 15 through December 15), use of lighting will be restricted to between 10:00 PM and 4:00 AM, when very few of the Covered Species are flying between the ocean and inland nesting colonies (Cooper and Day 2003). Lighting of the work area will be required in such situations, but all lights will be shielded and directed downward to the maximum extent practicable. KIUC workers will 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 SOS facility. The effects on fauna of each of the two categories of additional facilities for which ITP coverage is being sought are summarized below. Cumulatively, the additional facilities identified below are not expected to result in incidental take of the Covered Species beyond the level anticipated due to existing facilities after the avoidance and minimization measures proposed are implemented.

4.2.6.2.1 Impact of Future Additional Minor Facilities on Covered Species

As discussed below, the additional minor facilities that KIUC would develop over the term of the ITP do not have the potential to substantially affect Covered Species.

Table 4.5. Potential Effects of Power Line Reconfiguration on Flora.

Area	Length	Relevant Component	Potential Effects on Flora
Keālia	4,600 ft.	Reconfiguring wires on Poles	Reconfiguration of electrical wires on poles does not entail activities with the potential to affect flora.
Keālia	340 ft.	Keālia Bridge	Attaching 12 kV and telecommunications lines to the bridge and reconfiguration of electrical wires on poles does not involve activities with the potential to affect flora.
Keālia	3,300 ft.	Relocating Poles and Trenching	Trenching required for undergrounding entails groundcover altering activities. However, these would occur within existing road rights-of-way where only limited amounts of primarily non-native flora are present.
Hanapēpē Port Allen Side of Hanapepe River	700 ft.	Segment H-3. Lowering transmission wires.	Lowering the above-ground power lines does not involve ground disturbance or removal of vegetation. Hence, it does not have the potential to affect vegetation.
Hanapēpē River to Intersection of Lele Rd.	1,800 ft.	Segment H-4. Lowering transmission wires.	Lowering the above-ground power lines does not involve ground disturbance or removal of vegetation. Hence, it does not have the potential to affect vegetation.
Hanapēpē Town Bridge	500 ft.	Segment H-7. Lowering distribution circuit wires.	Lowering the above-ground power lines does not involve ground disturbance or removal of vegetation. Hence, it does not have the potential to affect vegetation.
Kapa‘a	2,640 ft.	Segment C1. Lowering and flattening 12kV Circuit	Lowering the above-ground power lines does not involve ground disturbance or removal of vegetation. Hence, it does not have the potential to affect vegetation.
Kapa‘a	130 ft.	Segment C2. Attaching 12kV circuit & Telecomm to Bridge	Attaching the 12 kV electrical circuit and telecommunications lines to the bridge does not involve ground disturbance or removal of vegetation. Hence, it does not have the potential to affect vegetation.

- *New Connections within Existing Service Areas (<1,320 feet)*. Approximately 75 percent of new connections within existing service areas can be satisfied by installing 50 to 125 feet of new wire from an existing pole or line to the customer’s meter. These connections generally start from an existing pole at a height of approximately 30 feet above ground level and terminate at a height of 8 to 15 feet above ground level. They are close to existing structures and often in locations that are beneath the height of existing vegetation. Because this is beneath the height at which nearly all of the Covered Species normally fly, the potential for collision is low. If any such new connections require the installation of new poles that extend higher than 45 feet above ground level, KIUC will submit the proposed exception to the agencies for review and opportunity to object. If an agency objects to the proposed exception, it must notify KIUC of its objections within 30 calendar days of

receipt of the request. The agencies may request up to ten (10) additional business days of review time so long as they submit their request for an extension no later than 25 calendar days after their receipt of KIUC's request. If the agencies do not respond within the allotted time, their lack of response shall be considered as having no objections to KIUC's request. The average number of new connection poles that would be allowed to be installed under the ITP annually (75) represents a 0.43 percent increase over the current total of approximately 17,500 poles and the maximum allowed during the 5 year ITP term represents 2.14 percent increase over the current total. The limited number of new connections that can be installed in the darker Northern portion of the island (no more than 3 per year or 13 during the 5-year term) minimizes the potential for increasing light levels within this area. For these reasons, the new connections are not expected to cause additional incidental take of Covered Species.

- *Electrical Equipment Additions to Existing Substations and Switchyards*. This typically involves work on equipment that is above grade on existing foundations, within existing structures, and or on previously disturbed areas that have a gravel base course already in place. This does not involve the operation of any equipment or the undertaking of any activities that have the potential to affect fauna significantly.
- *Minor Generating Station Equipment and Structure Additions*. The mechanical and electrical equipment that this involves is typically either above grade on existing foundations, within existing structures, or on previously disturbed areas that have a gravel base course already in place. Occasionally it entails low structures containing space for storage (e.g., warehouses), offices, training, and other utility related activities. So long as the structures do not have outdoor lighting, there is little potential for them to affect the Covered Species or other fauna. In cases where outdoor lighting is needed, it has the potential to exacerbate existing light attraction that could lead to an increase in the number of downed birds. If the use of such lights is found to increase the take anticipated beyond the level that would be authorized under the ITP will be approved, such take would not be authorized without amending the HCP and ITP.
- *Voltage Upgrade on Existing Poles*. Energizing the system at 69 kV rather than the existing 57 kV does not involve the operation of any equipment or the undertaking of any activities that have the potential to affect Covered Species.
- *Installation of Shielded Street Lights*. Installing additional full-cutoff streetlights on KIUC-owned poles in response to government and private requests does not involve the operation of any equipment or the undertaking of any activities that have the potential to affect terrestrial fauna. However, by adding to the overall amount of urban light, installing additional streetlights has the potential to exacerbate existing light attraction, and this could lead to an increase in the number of downed Covered Species. The average number of new streetlights that would be allowed to be installed under the ITP annually (75) represents a potential 2.1 percent increase over the current total of approximately 3,500 streetlights. The limited number of new streetlights that can be installed in the darker Northern portion of the island (no more than 3 per year or 13 during the 5-year term) minimizes the potential for increasing light levels within this area. For these reasons, the new streetlights are not expected to cause additional incidental take of Covered Species.
- *Fiberoptic Cable Installation*. The placement of fiberoptic cable does not involve the operation of any equipment or the undertaking of any activities that have the potential to affect Covered Species if it is done in lieu of existing static wires. In situations where the fiberoptic communication wire is at a level (i.e., height above ground) that differs from existing wires, this could marginally increase the potential for a collision. Because the Covered Species are more prevalent at greater heights above ground level, fiber-optic installations that are low on the poles have a lower likelihood to cause incidental take than those that are placed at the top of the poles, but the difference is not quantifiable at this time.

- *In-situ Replacement of Existing Lines or Other Facilities*. The in situ/in-kind replacement of existing lines or other small facilities does not involve the operation of any equipment or the undertaking of any activities that have the potential to affect Covered Species significantly. Replacement of lines or other facilities will only occur during daylight hours except under emergency conditions, and in those cases, all lights used will be shielded and directed downward to the maximum extent practicable. KIUC workers will 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 SOS facility.

4.2.6.2.2 Impact of Larger, Planned, Short-Term Projects on Covered Species

Because lights attract the Covered Species, KIUC will only conduct work during nighttime hours in emergency situations or when system conditions require nighttime work. Lighting of the work area will be required in such situations, but all lights will be shielded and directed downward to the maximum extent practicable. KIUC workers will 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 SOS facility.

For reasons explained below, most of the larger planned facilities that KIUC would develop over the term of the ITP have a limited potential to affect the Covered Species.

- *Aepo Substation*. The new electrical substation will be located on vacant/unused land and construction will occur during daylight hours. All of the facilities would be relatively low, with none exceeding 20 feet above ground level, and most substantially lower. The facility would be unlit and is in an area that does not have nearby streetlights. Hence, while it is conceivable that individuals of the Covered Species could collide with this facility, it is not expected to cause additional incidental take of Covered Species.
- *North Shore Reliability Enhancement Project*. Most of the work associated with this project entails the reconfiguration of wires on existing poles, the movement of existing poles from one location to another, and the addition of power lines to the side of the existing bridge over the Kalihiwai River. Much of the proposed new line is located in areas where the thick tree cover on both sides eliminates the potential for take of the Covered Species and another consists of a long segment in conduits attached to the side of the bridge over the Kalihiwai River. There is little potential for any increase in adverse effects to the Covered Species from these changes. Similarly, the segment that passes under the highway and into the Princeville Substation would be underground and has no potential for take. This leaves the addition of the proposed new overhead 69-kV circuit parallel to the highway between the western end of Kalihiwai Road and the entrance to Princeville as the only segment where some new potential for take would exist. The potential for collision is being minimized by using the lowest possible line height and mitigated/offset by changing the configuration of the existing 12 kV line that is mounted on the existing poles from vertical to horizontal. The combination of these factors will reduce the threat of collisions and it is not expected to cause additional incidental take of Covered Species.
- *Kapaia Power Station Generation Addition*. Construction and operation of the combustion turbine that KIUC proposes to install at its Kapaia Power Station will involve the use of a portion of the land that has been developed and set aside for the Kapaia Power Station. The effect that this would have on fauna (including the Covered Species) was evaluated in the EIS that was prepared for the Lihue Energy Service Center and was determined insignificant (Planning Solutions, Inc., 1999).

4.2.6.3 Impact of Proposed Mitigation/ Minimization Measures on Covered Species

The minimization and mitigation measures that KIUC has proposed as part of its HCP are described in Section 2.2.1.5. Their effects on Covered Species are summarized below.

4.2.6.3.1 Fund Implementation of SOS Program

As discussed in detail in the HCP, the information that is presently available indicates that by retrieving and releasing birds that would otherwise likely die, the SOS Program that KIUC would

fund has a positive effect on the Covered Species. The annual SOS reports for 2006, 2007, and 2008 are reproduced in Table 4.6, Table 4.7, and Table 4.8. During those years, between 84 and 88 percent (176 to 392 individuals) of the Newell's shearwaters handled by SOS Program staff were released alive and seemingly well.

Many of the birds handled by the SOS Program do not appear to have been brought down by direct contact with KIUC facilities. Instead, it appears that most of the retrieved and released birds have become grounded as a result of other, non-KIUC, causes or of general area lighting. With respect to the latter, KIUC is responsible only for the limited amount of light that continues to escape from the fully shielded streetlights that it operates on behalf of the County and from the few fully shielded lights that are necessary for safety and security at some of its facilities, e.g., Port Allen Generating Station.

The SOS Program retrieves, evaluates, rehabilitates as necessary, and releases additional species, such as wedge-tailed shearwater and white-tailed tropicbirds, that are turned into the aid stations, providing positive impacts to those species as well.

Table 4.6. Covered Species Retrieved in 2006.

Species	Total	Released w/o Rehab.	Rehab & Released	Total Released	DOA	Died in Captivity
Newell's Shearwater	467	356	36	392	58	17
Hawaiian Petrel	12	4	4	8	1	3
Band-rumped Storm-Petrel	1	0	0	0	1	0
Totals	***480***	***360***	***40***	***400***	***60***	***20***
Source: KIUC SOS Program Summary						

Table 4.7. Covered Species Retrieved in 2007.

Species	Total	Released w/o Rehab.	Rehab & Released	Total Released	DOA	Died in Captivity
Newell's Shearwater	302	235	14	249	33	20
Hawaiian Petrel	10	6	0	6	0	4
Band-rumped Storm-Petrel	6	6	0	6	0	0
Totals	***318***	***247***	***14***	***261***	***33***	***24***
Source: KIUC SOS Program Summary						

Table 4.8. Covered Species Retrieved in 2008.

Species	*Total*	Released w/o Rehab.	Rehab & Released	Total Released	*DOA/ Died in Aid Station*	*Died in Captivity*
Newell's Shearwater	198	163	13	176	14	8
Hawaiian Petrel	4	4	0	4	0	0
Band-rumped Storm-Petrel	2	0	2	2	0	0
Totals	***204***	***167***	***15***	***182***	***14***	***8***
Source: KIUC SOS Program Summary, Tables 4.2 and 4.3.						

4.2.6.3.2 Seabird Colony Management and Predator Control

Colony management in Limahuli Valley involves actions that have the potential to affect existing fauna because one of the principal objectives of the plan is to protect habitat for the Newell's shearwater and Hawaiian petrel, in addition to other native plant and animal species. Feral cats will be trapped and removed from the Preserve in an ongoing effort to keep the area cat-free. The protection and restoration of this area will increase the amount of protected habitat for nesting seabirds and reduce the probability of nest trampling by feral ungulates. By helping to stop the continuing destruction of native species and habitats caused by the foraging and trampling activities of goats and pigs and the creation of pig wallows in which mosquitoes breed, the project will have a beneficial effect on these species.[37] Bird monitoring efforts, such as trapping and handling individuals of the Covered Species, will be conducted by qualified biologists and no negative impacts are anticipated.

Invasive plant removal and predator control measures (i.e., cat trapping, rat baiting, and owl removal) within Hono O Nā Pali will have a beneficial impact on the Covered Species while decreasing predator presence, similar to that of Limahuli Valley.

Based on the preliminary population and habitat modeling being conducted as the KSHCP is being developed, the area within the two Newell's shearwater nesting colonies that will be managed under the proposed HCP may contain over six percent of the Kaua'i population and be used by up to 173 breeding pairs. Should the HCP continue into Years 4 and 5, the same kinds of activities would occur in Wainiha Valley or other suitable location as those described above for Limahuli Valley and Hono O Nā Pali and an additional area containing over 14 percent of the Kaua'i Newell's shearwater population and up to an additional 400 breeding pairs. As the environment in Wainiha is similar to that in Limahuli Valley and Hono O Nā Pali, the effects of these activities would be similar as well.

The increases in survival rates and reproductive success of the Covered Species that are expected due the colony management efforts will require long-term monitoring before they can be quantified. Results from the monitoring efforts will be used to increase the accuracy of the population models being developed as part of the KSHCP planning efforts. While the number and distribution of Hawaiian petrels and band-rumped storm-petrels on Kaua'i is not well documented based on the overlap in habitat used for nesting by Newell's shearwater, the management actions proposed under the Short-term HCP to be conducted within the seabird nesting colonies is expected to produce similar benefits to those species.

4.2.6.3.3 Auditory Survey to Locate Additional Seabird Breeding Colonies

Conducting a survey designed to locate additional seabird breeding colonies involves accessing areas on foot. Surveyors will be trained in identifying and avoiding impacts to nesting individuals of the Covered Species and no impacts are anticipated to them.

4.2.6.3.4 Development and Implementation of Appropriate Underline Monitoring Program

Conducting a monitoring program designed to confirm the number of birds that are being adversely affected may involve accessing vegetated areas on foot, but surveys will not likely include any areas occupied by nesting seabirds. Monitors will be trained in identifying and avoiding impacts to nesting individuals of the Covered Species and no impacts are anticipated to them.

4.2.6.3.5 Reconfigure Existing Overhead Electrical Power Lines at Selected Locations

The intent of reconfiguring electrical power lines is to reduce the risk of collision from the Covered Species. The actual reduction in collision risk due to these efforts will be difficult to quantify given the lack of monitoring data, but the underline monitoring program proposed under the HCP will include monitoring under these segments. Results from the monitoring efforts will be used to increase the accuracy of the population models being developed as part of the KSHCP planning

[37] Because these wallows are major sources of mosquito reproduction (and because mosquitoes are the primary vector of diseases that harm native birds), a decrease in these wallows is expected to have a beneficial effect for native bird species.

efforts. For reasons summarized in Table 4.9, none of the power line reconfiguration projects KIUC proposed have the potential to adversely affect Covered Species.

4.2.6.4 Estimated Annual Take of Covered Species by Existing Facilities

4.2.6.4.1 Estimated Annual Take: Newell's Shearwaters

Table 4.10, which is from the HCP, combines all of the factors relevant to estimating take using the approach developed by Ainley et al. (1995) to arrive at an estimated annual take by KIUC power lines and lights. Based on these estimates, KIUC rounded upwards and is seeking incidental take authorization through the short-term HCP for 125 Newell's shearwater mortalities and 55 Newell's shearwaters non-lethal injuries (birds that land on the ground due to light attraction, but appear uninjured and are picked up and brought to a release site via the SOS Program). These estimates were based on impacts due to KIUC's existing facilities, and were not reduced according to any anticipated reductions in take associated with the avoidance and minimization actions described under the Proposed Action because the reductions are not quantifiable. The Service considers these estimates to be as accurate as can be made at this time, and if incorrect, they are overestimates of the take occurring currently because KIUC has implemented actions (i.e., shielding all existing streetlights) that were expected to reduce both light attraction and collision risk after these estimates were made. The annual take of 87 adult Newell's shearwaters represents 0.46 percent of the 18,900 adults estimated to use the island. The indirect loss of 18 chicks/eggs represents impacts to 0.5 percent of the estimated 3,300 eggs laid by breeding pairs on Kauaʻi annually. The authorization of the death or injury to 72 fledglings represents impacts to 3.3 percent of the 2,173 Newell's shearwater that are estimated to fledge annually on Kauaʻi. Based on the estimated survival rate of Newell's shearwater from fledgling to breeding age of 0.333 (Ainley et al. 2001), approximately 24 of those 72 fledglings would have survived until adulthood.

4.2.6.4.2 Estimated Annual Take: Hawaiian Petrel

Ainley et al. (1995) concluded: "To date impact and fallout and collisions with power lines on dark-rumped petrels has been minimal". Two major factors may account for the apparent difference in power line effect between the two species. One is the smaller population of Hawaiian petrels estimated to be on Kauaʻi. The other is that Hawaiian petrels tend to do more of their over-land flying before full darkness than do Newell's shearwaters, a pattern which probably makes it easier for them to see and avoid overhead wires. Whatever the cause, during the 30-year SOS Program history, 293 Hawaiian petrels have been retrieved, or an average of 9.8 birds a year, over 80 percent of which were released alive. This is less than one percent of the number of Newell's shearwaters retrieved during the same period. Assuming the 50 percent "conservative" discovery rate estimated by Ainley et al. (1995) for Newell's shearwaters is similar for Hawaiian petrels, it is possible that as many as 20 of these birds are downed annually.

Table 4.9. Potential Effects of Power Line Reconfiguration on Covered Species.

Area	Length	Relevant Component	Potential Effects on Covered Species
Keālia	4,600 ft.	Reconfiguring wires on Poles	Reducing the height and number of layers of aboveground electrical power lines has a beneficial effect on avian species. It does not involve ground disturbance or other activities with the potential to harm Covered Species.
Keālia	340 ft.	Keālia Bridge	Attaching 12 kV and telecommunications lines to the bridge and reconfiguration of electrical wires on poles entails limited would reduce the height and number of layers of aboveground electrical power lines, thereby producing a beneficial effect on avian species. It would not affect Covered Species.
Keālia	3,300 ft.	Relocating Poles and Trenching. Lowering transmission wires.	Trenching required for undergrounding and pole relocation would not adversely affect terrestrial or aquatic fauna known to use the area. Reducing the height and number of layers of aboveground electrical power lines has a beneficial effect on Covered Species.
Hanapēpē Port Allen Side of Hanapepe River	700 ft.	Segment H-3. Lowering transmission wires.	Reducing the height and number of layers of aboveground electrical power lines has a beneficial effect on avian species. It does not involve ground disturbance or other activities with the potential to harm Covered Species.
Hanapēpē River to Intersection of Lele Rd.	1,800 ft.	Segment H-4. Lowering transmission wires.	Reducing the height and number of layers of aboveground electrical power lines has a beneficial effect on avian species. It does not involve ground disturbance or other activities with the potential to harm Covered Species.
Hanapēpē Town Bridge	500 ft.	Segment H-7. Lowering distribution circuit wires.	Reducing the height and number of layers of aboveground electrical power lines has a beneficial effect on avian species. It does not involve ground disturbance or other activities with the potential to harm Covered Species.
Kapa‘a	2,640 ft.	Segment C1. Lowering and flattening 12kV Circuit	Reducing the height and number of layers of aboveground electrical power lines has a beneficial effect on avian species. It does not involve ground disturbance or other activities with the potential to harm Covered Species.
Kapa‘a	130 ft.	Segment C2. Attaching 12kV circuit & Telecomm to Bridge	Attaching the electrical power and telecommunications wires to the bridge has a beneficial effect on avian species. It does not involve ground disturbance or other activities with the potential to harm Covered Species.

Table 4.10. Estimated Annual Take of Newell's Shearwaters by KIUC Lights and Facilities.

Take Categories	*Estimated Annual Take*	
	Mortalities	***Non-Lethal Downings***
POWER LINES		
Breeding Adult Mortalities	17.3	
Non-breeding Adult/Subadult Mortalities	69.3	
Indirect Chick Mortalities	17.3	
LIGHT ATTRACTION	0	
Fledgling Mortalities	17.9	
Fledgling Downings	0	53.7
TOTAL	***121.8***	***53.7***

Because the numbers of Hawaiian petrels being downed is so much lower than the number of Newell's shearwaters, similar approaches to estimating the take occurring are not feasible. For the purposes of the HCP, the proportion of the Hawaiian petrel take due to KIUC lights or facilities is estimated to be 10 percent of the total, and the annual take authorized under the ITP would be two birds. The annual take of 2 Hawaiian petrels represents 0.01 percent of the total population estimate of 20,000.

4.2.6.4.3 Estimated Annual Take: Band-Rumped Storm-Petrel

As discussed in the preceding chapter, the number of band-rumped storm-petrels on Kaua'i is believed to be very small, with Wood et al. (2002) estimating the breeding population at 171 to 221 pairs. Not surprisingly then, very few band-rumped storm-petrels have been retrieved by the SOS Program – a total of 24 during its 30 year history. None of these retrieved birds has been clearly associated with utility structures, though the fallout of at least some of these individuals was probably influenced by outdoor lighting, including the streetlights that KIUC owns and operates on behalf of the County. With no evidence implicating KIUC utility structures with the downing of this species and such a small number of retrievals, statistically determining the annual KIUC-related take for this species is problematic. Because of the extremely low probability that KIUC lights or facilities cause take to band-rumped storm-petrels in any year, the annual take authorized under the ITP would be two birds. The annual take of 2 band-rumped storm-petrels could represent as high as 5.8 percent of the total population estimate of 171-221 breeding pairs on the island (Wood et al. 2002).

4.2.7 IMPACTS ON SCENIC RESOURCES

4.2.7.1 Impact of Additional Operations on Scenic Resources

The effects on scenic resources of each of the two categories of additional facilities for which ITP coverage is being sought are summarized below.

4.2.7.1.1 Impact of Future Additional Minor Facilities on Scenic Resources

As discussed below, the additional minor facilities that KIUC would develop over the term of the ITP do not have the potential to substantially affect existing scenic resources.

- *New Connections within Existing Service Areas (<1,320 feet)*. Approximately 75 percent of new connections within existing service areas can be satisfied by installing 50 to 125 feet of new wire from an existing pole or line to the customer's meter. The nature of these facilities is such that they do not, except in rare instances, have any potential to affect scenic resources. It is possible that there are unique circumstances where an extension of this magnitude could place new lines at a critical scenic overlook. KIUC management normally reviews proposals to insure that there are no unique circumstances that might require a special solution (such as the use of an underground connection), but it is possible that a project that qualifies under this heading could have a small, localized adverse effect on scenic resources.
- *Electrical Equipment Additions to Existing Substations and Switchyards*. This typically involves work on equipment that is above grade on existing foundations, within existing structures, and or on areas that have a gravel base course already in place. This does not involve the operation of any equipment or the undertaking of any activities that have the potential to affect scenic resources significantly.
- *Minor Generating Station Equipment and Structure Additions*. The mechanical and electrical equipment that this involves is typically either above grade on existing foundations, within existing structures, or on areas that have a gravel base course already in place. Occasionally it entails low structures containing space for storage (e.g., warehouses), offices, training, and other utility related activities. This does not involve activities that have the potential to affect scenic resources.
- *Voltage Upgrade on Existing Poles*. Energizing the system at 69 kV rather than the existing 57 kV does not involve the operation of any equipment or the undertaking of any activities that have the potential to affect scenic resources.

- *Installation of Shielded Street Lights*. Installing additional streetlights on KIUC-owned poles in response to government and private requests does not involve the operation of any equipment or the undertaking of any activities that have the potential to affect scenic resources.
- *Fiberoptic Cable Installation*. The placement of fiberoptic cable does not involve the operation of any equipment or the undertaking of any activities that have the potential to affect scenic resources significantly.
- *In-situ Replacement of Existing Lines or Other Facilities*. The in situ/in-kind replacement of existing lines or other small facilities does not involve the operation of any equipment or the undertaking of any activities that have the potential to affect scenic resources significantly.

4.2.7.1.2 Impact of Larger, Planned, Short-Term Projects on Scenic Resources

Most of the larger planned facilities that KIUC would develop over the term of the ITP do not have the potential to affect scenic resources. The reasons for this, as well as the exceptions, are discussed below.

- *Aepo Substation*. The new electrical substation will be located on vacant/unused land. Minor grading of the gently sloping site will be required, but the site is relatively level and cannot be seen from heavily visited viewpoints. It is adjacent to an existing electrical transmission line and will not require the installation of poles or wires that have the potential to degrade the visual environment.
- *North Shore Reliability Enhancement Project*. Most of the work associated with this project entails the reconfiguration of wires on existing poles, the movement of existing poles from one location to another, and the addition of power lines to the side of the existing bridge over the Kalihiwai River. This work will entail the relocation of a number of existing power poles and the installation of new poles and power transmission lines on the approaches to the Kūhiō Highway Bridge over Kalihiwai Stream, and these would be visible from vehicles using the highway. On the ridge itself, the new lines would be placed in conduits attached to existing cable brackets and would not be visible.
- *Kapaia Power Station Generation Addition*. Construction and operation of the combustion turbine that KIUC proposes to install at its Kapaia Power Station will involve the use of a portion of the land that has been developed and set aside for the Kapaia Power Station. The visual effects of this were evaluated in the EIS that was prepared for the Lihue Energy Service Center, and none were determined to be significant (Planning Solutions, Inc., 1999).

4.2.7.2 Impact of Proposed Mitigation/ Minimization Measures on Scenic Resources

The minimization and mitigation measures that KIUC has proposed as part of its HCP are described in Section 2.2.1.5. Their effects on scenic resources are summarized below.

4.2.7.2.1 Implementation of SOS Program

Operation of the SOS Program does not involve any activities with the potential to affect scenic resources because it does not involve the construction or installation of any new facilities.

4.2.7.2.2 Seabird Colony Management and Predator Control

The actions that are required to manage the seabird colonies in Limahuli Valley and Hono O Nā Pali will take place in remote areas. Because of this, and the fact that these activities will protect and enhance native habitats, they do not have the potential to affect scenic resources or views adversely.

Should the HCP continue into Years 4 and 5, the same kinds of activities would occur in Wainiha Valley as those described above for Limahuli Valley. As the environment in Wainiha is similar to that in Limahuli, the effects of these activities would be similar as well.

4.2.7.2.3 Auditory Survey to Locate Additional Seabird Breeding Colonies

Conducting a survey designed to locate additional seabird breeding colonies does not involve activities that have the potential to affect visual resources because it does not involve the construction or installation of any new facilities.

4.2.7.2.4 Fund Development and Implementation of Appropriate Underline Monitoring Program

Monitoring beneath power lines to confirm the number of birds that are being adversely affected does not involve any activities that have the potential to affect visual resources because it does not involve the construction or installation of any new facilities.

4.2.7.2.5 Reconfigure Existing Overhead Electrical Power Lines at Selected Locations

For reasons summarized in Table 4.11, none of the power line reconfiguration projects that KIUC has proposed has the potential to affect scenic resources substantially.

Table 4.11. Potential Effects of Power Line Reconfiguration on Scenic Resources.

Area	Length	Relevant Component	Potential Effects on Scenic Resources
Keālia	4,600 ft.	Reconfiguring wires on Poles	Reconfiguration of electrical wires on existing poles would bring the wires slightly closer to ground-level viewers, but would reduce the apparent mass of the overhead power line complex.
Keālia	340 ft.	Keālia Bridge	Attaching 12 kV and telecommunications lines to the bridge and reconfiguration of electrical wires on poles would reduce the number of visible facilities.
Keālia	3,300 ft.	Relocating Poles. Lowering transmission wires	Reconfiguration of electrical wires on existing poles and undergrounding the distribution wires would bring the transmission wires slightly closer to ground-level viewers, but would reduce the apparent mass of the overhead power line complex.
Hanapēpē Port Allen Side of Hanapepe River	700 ft.	Segment H-3. Lowering transmission wires.	Reconfiguration of electrical wires on existing poles would bring the wires slightly closer to ground-level viewers, but would not otherwise alter the appearance of the existing overhead power line complex.
Hanapēpē River to Intersection of Lele Rd.	1,800 ft.	Segment H-4. Lowering transmission wires.	Reconfiguration of electrical wires on existing poles would bring the wires slightly closer to ground-level viewers, but would not otherwise alter the appearance of the existing overhead power line complex.
Hanapēpē Town Bridge	500 ft.	Segment H-7. Lowering distribution circuit wires.	Reconfiguration of electrical wires on existing poles would bring the wires slightly closer to ground-level viewers, but would not otherwise alter the appearance of the existing overhead power line complex.
Kapaʻa	2,640 ft.	Segment C1. Lowering and flattening 12kV Circuit	Reconfiguration of electrical wires on existing poles would bring the wires slightly closer to ground-level viewers, but would not otherwise alter the appearance of the existing overhead power line complex.
Kapaʻa	130 ft.	Segment C2. Attaching 12kV circuit & Telecomm to Bridge	Attaching 12 kV and telecommunications lines to the bridge and reconfiguration of electrical wires on poles would reduce the number of visible facilities.

4.2.8 IMPACTS ON HISTORIC, ARCHAEOLOGICAL, AND CULTURAL RESOURCES

4.2.8.1 Impact of Additional Facilities on Historic, Archaeological, & Cultural Resources

The effects on scenic resources of each of the two categories of additional facilities for which ITP coverage is being sought are summarized below.

4.2.8.1.1 Impact of Future Additional Minor Facilities on Historic, Archaeological, & Cultural Resources

As discussed below, the additional minor facilities that KIUC would develop over the term of the ITP do not have the potential to affect substantially affect existing historic, archaeological, & cultural resources.

- *New Connections within Existing Service Areas (<1,320 feet)*. This work is done in response to customer requests. In nearly all instances it is in areas where County and/or State agencies have reviewed and approved plans, often imposing conditions designed to assure the protection of historic, archaeological, and cultural resources. That, and the very limited nature of the work that is needed for KIUC to provide such service, means that the potential for adverse effect from actions in this category is not significant.
- *Electrical Equipment Additions to Existing Substations and Switchyards*. This typically involves work on equipment that is above grade on existing foundations, within existing structures, and or on previously disturbed areas that have a gravel base course already in place. Such work does not have the potential to affect historic, archaeological, and cultural resources significantly.
- *Minor Generating Station Equipment and Structure Additions*. The mechanical and electrical equipment that this involves is typically either above grade on existing foundations, within existing structures, or on previously disturbed areas that have a gravel base course already in place. Occasionally it entails low structures containing space for storage (e.g., warehouses), offices, training, and other utility related activities. In nearly all instances it is in areas where County and/or State agencies have reviewed and approved plans, often imposing conditions designed to protect historic, archaeological, and cultural resources. Consequently, there is little potential for this category of activities to affect significant historic, archaeological, and cultural resources.
- *Voltage Upgrade on Existing Poles*. Energizing the system at 69 kV rather than the existing 57 kV does not involve activities that have the potential to affect significant historic, archaeological, and cultural resources.
- *Installation of Shielded Street Lights*. Installing additional streetlights on KIUC-owned poles in response to government and private requests does not involve activities that have the potential to affect significant historic, archaeological, and cultural resources.
- *Fiberoptic Cable Installation*. The placement of fiberoptic cable does not involve the operation of any equipment or the undertaking of any activities that have the potential to affect significant historic, archaeological, and cultural resources.
- *In-situ Replacement of Existing Lines or Other Facilities*. The in situ/in-kind replacement of existing lines or other small facilities does not involve the operation of any equipment or the undertaking of any activities that have the potential to affect significant historic, archaeological, and cultural resources.

4.2.8.1.2 Impact of Larger, Planned, Short-Term Projects on Historic/Archaeological/Cultural Resources

Most of the larger planned facilities that KIUC would develop over the term of the ITP do not have the potential to affect significant historic, archaeological, and cultural resources. The reasons for this, as well as the exceptions, are discussed below.

- *Aepo Substation*. The new electrical substation will be located on vacant/unused land. Minor grading of the gently sloping site will be required, but the site is relatively level, and so the depth of the required grading is small. The State Historic Preservation Division reviewed plans for the substation and issued a finding that the project will not affect historic properties (State of Hawaii, State Historic Preservation Division 2008).
- *North Shore Reliability Enhancement Project*. Most of the work associated with this project entails the reconfiguration of wires on existing poles, the movement of existing poles from one location to another, and the addition of power lines to the side of the existing bridge over the Kalihiwai River. However, this project will also entail the relocation of a number of existing power poles and the installation of new poles and power transmission lines on the approaches to the Kūhiō Highway bridge over Kalihiwai Stream. The poles that will be relocated, as well as the relatively short underground portions of the project, are located in areas that have previously been disturbed and for which development approvals (for road construction and/or development of the Princeville

development project) and historic preservation Division review are completed. Consequently, the potential for adverse effect on historic, archaeological, and cultural properties is believed to be small. Nonetheless, KIUC will consult again with SHPD once preliminary construction plans for the project are available to confirm that the siting of facilities is appropriate and that satisfactory archaeological monitoring is provided for. If significant impacts are identified, a supplemental EA will be prepared and processed.

- *Kapaia Power Station Generation Addition*. Construction and operation of the combustion turbine that KIUC proposes to install at its Kapaia Power Station will involve the use of a portion of the land that has been developed and set aside for the Kapaia Power Station. The effects of this were evaluated in the EIS for the Līhu'e Energy Service Center (Planning Solutions, Inc., 1999), and the State of Hawai'i Historic Preservation Division concluded that none were significant.

4.2.8.2 Impact of Proposed Mitigation/ Minimization Measures on Historic/Archaeological/Cultural Resources

The minimization and mitigation measures that KIUC has proposed as part of its HCP are described in Section 2.2.1.5. Their effects on historic, archaeological, or cultural resources are summarized below.

4.2.8.2.1 Implementation of SOS Program

Operation of the SOS Program does not involve any activities with the potential to affect historic, archaeological, or cultural resources.

4.2.8.2.2 Seabird Colony Management and Predator Control

The actions that are required to manage the seabird colonies in Limahuli Valley and Hono O Nā Pali will take place at carefully selected locations in remote areas where there are no known archaeological or cultural sites and therefore will result in no significant effects.

Should the HCP continue into Years 4 and 5, the same kinds of activities would occur in Wainiha Valley as those described above for Limahuli Valley. As the environment in Wainiha is similar to that in Limahuli, the effects of these activities would be similar as well. Once the mitigation actions are identified, if there are any archaeological or cultural sites that may be impacted, a supplemental NEPA analysis will be prepared prior to implementation.

4.2.8.2.3 Auditory Survey to Locate Additional Seabird Breeding Colonies

Conducting a survey designed to locate additional seabird breeding colonies will involve limited on-foot surveys; no ground disturbance or similar work will be needed. Neither will any barriers or other facilities be erected. Consequently, this measure does not have the potential to affect historic, archaeological, or cultural resources.

4.2.8.2.4 Development and Implementation of Appropriate Underline Monitoring Program

Monitoring beneath power lines to confirm the number of birds that are being adversely affected is expected to be limited to visual surveys conducted on foot. These do not have the potential to have a significant effect on historic, archaeological, or cultural resources.

4.2.8.2.5 Reconfigure Existing Overhead Electrical Power Lines at Selected Locations

For reasons summarized in Table 4.12, none of the power line reconfiguration projects that KIUC has proposed has the potential to substantially affect historic, cultural, or archaeological resources.

4.2.9 IMPACTS ON EXISTING LAND USE

4.2.9.1 Impact of Additional Facilities on Existing Land Use

The effects on existing land use of each of the two categories of additional facilities for which ITP coverage is being sought are summarized below.

Table 4.12. Potential Effects of Power Line Reconfiguration on Historic/Archaeological/ Cultural Resources.

Area	Length	Relevant Component	Potential Effects on Historic/Archaeological/Cultural Resources
Keālia	4,600 ft	Reconfiguring wires on Poles	Reconfiguring the electrical wires on poles that are within the road right-of-way does not entail ground disturbance or other activities that have the potential to affect Historic/Archaeological/Cultural Resources.
Keālia	340 ft.	Keālia Bridge	Attaching 12 kV and telecommunications lines to the bridge and reconfiguring electrical wires on poles does not entail ground disturbance or other activities that have the potential to affect Historic/Archaeological/Cultural Resources.
Keālia	3,300 ft.	Relocating Poles and Trenching	Trenching required for undergrounding entails activities that have the potential to uncover unidentified remains. Monitors will be present during excavation to halt work in the event archaeological or cultural remains are encountered. A proposed monitoring plan is attached as Appendix A and has been submitted to the SHPD.
Hanapēpē Port Allen Side of Hanapepe River	700 ft.	Segment H-3. Lowering transmission wires.	Lowering the dual circuit of transmission on poles that are within the road right-of-way does not entail ground disturbance or other activities that have the potential to affect Historic/Archaeological/Cultural Resources.
Hanapēpē River to Intersection of Lele Rd.	1,800 ft.	Segment H-4. Lowering transmission wires.	Lowering the dual circuit of transmission on poles that are within the road right-of-way does not entail ground disturbance or other activities that have the potential to affect Historic/Archaeological/Cultural Resources.
Hanapēpē Town Bridge	500 ft.	Segment H-7. Lowering distribution circuit wires.	Lowering the transmission lines that are on poles situated within the road right-of-way does not entail ground disturbance or other activities that have the potential to affect Historic/Archaeological/Cultural Resources.
Kapa‘a	2,640 ft.	Segment C1. Lowering and flattening 12kV Circuit	Lowering the transmission lines that are on poles situated within the road right-of-way does not entail ground disturbance or other activities that have the potential to affect Historic/Archaeological/Cultural Resources.
Kapa‘a	130 ft.	Segment C2. Attaching wire to Bridge	Attaching 12 kV and telecommunications lines to the bridge and reconfiguration of electrical wires on poles does not entail ground disturbance or other activities that have the potential to affect Historic/Archaeological/Cultural Resources.

4.2.9.1.1 Impact of Future Additional Minor Facilities on Existing Land Use

As discussed below, the additional minor facilities that KIUC would develop over the term of the ITP do not have the potential to affect existing land use substantially.

- *New Connections within Existing Service Areas (<1,320 feet)*. New connections are provided in response to customer requests. In nearly all instances it is in areas where County and/or State agencies have reviewed and approved plans and deemed that the use is appropriate and consistent with existing land uses in the area, sometimes imposing conditions designed to assure that this is the case. That and the very limited nature of the work that is needed for KIUC to provide such service means that the potential for these new connections to significantly affect existing land uses adversely is very small.
- *Electrical Equipment Additions to Existing Substations and Switchyards*. This typically involves work on equipment that is above grade on existing foundations, within existing structures, and or on areas that have a gravel base course already in place. County and/or State agencies have reviewed and approved plans and deemed that the use is appropriate and consistent with existing land uses in the area, sometimes imposing conditions designed to assure that this is the case. Such work does not have the potential to have a significant adverse effect on existing land uses. Neither does it preclude or unreasonably constrain possible future use of adjacent areas. In some cases the additions increase the capacity of the facilities above their present levels and this can facilitate urban development in accordance with approved land use plans.

- *Minor Generating Station Equipment and Structure Additions*. The mechanical and electrical equipment that this involves is typically either above grade on existing foundations, within existing structures, or on areas that have a gravel base course already in place. Occasionally it entails low structures containing space for storage (e.g., warehouses), offices, training, and other utility related activities. In nearly all instances County and/or State agencies have reviewed and approved plans and deemed that the use is appropriate and consistent with existing land uses in the area, sometimes imposing conditions designed to assure that this is the case. Consequently, there is little potential for this category of activities to affect existing land uses adversely.
- *Voltage Upgrade on Existing Poles*. Energizing the system at 69 kV rather than the existing 57 kV does not involve activities that have the potential to affect existing land uses adversely.
- *Installation of Shielded Street Lights*. Installing additional streetlights on KIUC-owned poles in response to government and private requests does not involve activities that have the potential to affect existing land uses adversely.
- *Fiberoptic Cable Installation*. The placement of fiberoptic cable on existing poles does not involve the operation of any equipment or the undertaking of any activities that have the potential to affect existing land uses adversely.
- *In-situ Replacement of Existing Lines or Other Facilities*. The in situ/in-kind replacement of existing lines or other small facilities does not involve the operation of any equipment or the undertaking of any activities that have the potential to affect existing land uses adversely.

4.2.9.1.2 Impact of Larger, Planned, Short-Term Projects on Existing Land Use

For reasons explained below, most of the larger planned facilities that KIUC would develop over the term of the ITP do not have the potential to affect existing land uses adversely.

- *Aepo Substation*. The new electrical substation will be located on vacant/unused land far from other uses. The County of Kauaʻi has already approved the development permits needed to construct the substation.
- *North Shore Reliability Enhancement Project*. Most of the work associated with this project entails the reconfiguration of wires on existing poles, the movement of existing poles from one location to another, and the addition of power lines to the side of the existing bridge over the Kalihiwai River. This work will entail the relocation of a number of existing power poles and the installation of new poles and power transmission lines on the approaches to the bridge that carries Kūhiō Highway over Kalihiwai Stream. Only a few of the poles (principally those closest to the western side of Kalihiwai Stream, are less than a few hundred feet from existing residential and/or commercial uses. The Princeville Development Corporation, within whose property a good portion of the route is located, supports the project. In view of the foregoing, this measure is not expected to have a significant adverse effect on existing land use.[38]
- *Kapaia Power Station Generation Addition*. Construction and operation of the combustion turbine that KIUC proposes to install at its Kapaia Power Station will involve the use of a portion of the land that has been developed and set aside for the Kapaia Power Station. The effects of this were evaluated in the EIS for the Līhuʻe Energy Service Center (Planning Solutions, Inc., 1999). As the improvements would occur on a site that has already been approved for the proposed use, no significant adverse effect on land use is to be expected.

4.2.9.2 Impact of Proposed Mitigation/ Minimization Measures on Land Use

The minimization and mitigation measures that KIUC has proposed as part of its HCP are described in Section 2.2.1.5. Their effects on land use are summarized below.

[38] Initially, the Princeville Development Corporation expressed an interest in paying for the undergrounding of a portion of the route closest to land that it owns but has not yet developed. However, the high incremental cost of undergrounding the line led it to suspend that request.

4.2.9.2.1 Implementation of SOS Program

Operation of the SOS Program does not involve any activities with the potential to affect land use.

4.2.9.2.2 Seabird Colony Management and Predator Control

The actions that are required to manage the seabird colonies in Limahuli Valley and Hono O Nā Pali will take place in remote areas that the owners have set aside with the intent of managing it to promote habitat preservation. The proposed action is entirely consistent with and supportive of that purpose. Hence, implementation of the measures in the HCP will support the desired land use.

Should the HCP continue into Years 4 and 5, the same kinds of activities would occur in Wainiha Valley as those described above for Limahuli Valley and the proposed actions are also consistent with its current use.

4.2.9.2.3 Auditory Survey to Locate Additional Seabird Breeding Colonies

Conducting a survey designed to locate additional seabird breeding colonies will involve limited on-foot surveys; no ground disturbance or similar work will be needed. Neither will any barriers or other facilities be erected. Consequently, this measure does not have the potential to affect land use.

4.2.9.2.4 Development and Implementation of Appropriate Underline Monitoring Program

Monitoring beneath power lines to confirm the number of birds that are being adversely affected is expected to be limited to visual surveys conducted on foot. These do not have the potential to have a significant effect on land use.

4.2.9.2.5 Reconfigure Existing Overhead Electrical Power Lines at Selected Locations

For reasons summarized in Table 4.13, none of the power line reconfiguration projects that KIUC has proposed has the potential to affect land use substantially.

4.2.10 IMPACTS ON PUBLIC INFRASTRUCTURE AND SERVICES

4.2.10.1 Impact of Additional Facilities on Roadways and Ground Transportation

The effects on existing roadways and ground transportation of each of the two categories of additional facilities for which ITP coverage is being sought are summarized below.

4.2.10.1.1 Impact of Future Additional Minor Facilities on Roadways and Ground Transportation

None of the minor additional facilities for which KIUC has requested coverage have the potential to generate substantial volumes of vehicular traffic, to interrupt/interfere with the use of existing roadways, or to create situations that might otherwise have a substantial effect on the operation of those existing or planned roadways. Some of the covered activities do have the potential to have minor, brief effects on traffic flow. Examples include the installation of street lights (when this must be done on existing roadways) and line extensions (when lanes must be closed for short periods to allow crews to work safely). These interruptions, which are limited to periods ranging from a few minutes to a few hours, are scheduled for non-peak periods, and are accompanied by appropriate traffic control measures. As a result, they do not have significant adverse effects on traffic flow.

4.2.10.1.2 Impact of Larger, Planned, Short-Term Project on Roadways and Ground Transportation.

Aepo Substation. The Aepo Substation does not involve changes to existing roadways and would not generate significant amounts of vehicular traffic on them. Hence, it does not have the potential to affect roadways adversely. Construction and operation of the combustion turbine that KIUC proposes to install at its Kapaia Power Station will generate a modest amount of construction traffic and a much smaller volume of traffic once it becomes operational; the effects of this were evaluated in the EIS for the Līhu‘e Energy Service Center (Planning Solutions, Inc., 1999) and the impacts determined to be insignificant.

Table 4.13. Potential Effects of Power Line Reconfiguration on Land Use.

Area	Length	Relevant Component	Potential Effects on Land Use
Keālia	4,600 ft.	Reconfiguring wires on Poles	Reconfiguring the electrical wires on poles that are within the road right-of-way does not entail changes that have the potential to affect land use.
Keālia	340 ft.	Keālia Bridge	Attaching 12 kV and telecommunications lines to the bridge and reconfiguring electrical wires on poles does not entail changes that have the potential to affect land use.
Keālia	3,300 ft.	Relocating Poles and Trenching	Trenching required for undergrounding does not entail changes that have the potential to affect land use.
Hanapēpē Port Allen Side of Hanapepe River	700 ft.	Segment H-3. Lowering transmission wires.	Lowering the dual circuit of transmission on poles that are within the road right-of-way does not entail changes that have the potential to affect land use.
Hanapēpē River to Intersection of Lele Rd.	1,800 ft.	Segment H-4. Lowering transmission wires.	Lowering the dual circuit of transmission on poles that are within the road right-of-way does not entail changes that have the potential to affect land use.
Hanapēpē Town Bridge	500 ft.	Segment H-7. Lowering distribution circuit wires.	Lowering the transmission lines that are on poles situated within the road right-of-way does not entail changes that have the potential to affect land use.
Kapaʻa	2,640 ft.	Segment C1. Lowering and flattening 12kV Circuit	Lowering the transmission lines that are on poles situated within the road right-of-way does not entail changes that have the potential to affect land use.
Kapaʻa	130 ft.	Segment C2. Attaching wire to Bridge	Attaching the 12kV distribution circuit to the bridge does not entail changes that have the potential to affect land use. .

North Shore Reliability Enhancement Project. Work needed to construct portions of the improvements that make up the North Shore Reliability Enhancement Project will affect traffic flow on Kūhiō Highway from the eastern approach to the bridge over the Kalihiwai River to the existing Princeville Substation. It will require lane closures with flagmen/traffic control devices. Work on the bridge crossing may be the most problematic as the vehicles moving in one direction must clear the bridge before those moving in the opposite direction can start. The work is expected to be scheduled for off-peak hours and be limited to a period of a few months or less. While some traffic delays are unavoidable, these will not be significant.

4.2.10.2 Impact of Proposed Mitigation/Minimization Measures on Roadways & Ground Transportation

For the most part, the mitigation and minimization measures that KIUC has proposed as part of its HCP have little or no potential to affect roadways adversely. Operation of the SOS Program requires a few vehicle-trips to the aid stations each day, but these are typically made at off-peak hours and do not have the potential to increase traffic congestion measurably. The actions that are required to manage the seabird colonies in Limahuli Valley, Hono O Nā Pali, and Wainiha Valley will take place in remote areas, and the transport of workers and materials needed for the work will involve far too few vehicle-trips to affect traffic. The efforts required for updating the at-sea seabird population estimates and conducting a survey designed to locate additional seabird breeding colonies will have no impacts on roadways or ground transportation. Finally, while monitoring for downed birds will involve occasional use of island roadways and staff work along the sides of those roads, this will not obstruct traffic movement or otherwise affect the system.

For reasons summarized in Table 4.14, the power line reconfiguration projects that KIUC has proposed are likely to slow traffic through affected areas for brief periods during construction. The

Kealia segment, which entails trenching in order to underground the 12 kV lines, is the only area where has the potential slowdowns are likely to persist for a period of more than a few days or weeks.

Table 4.14. Potential Effects of Power Line Reconfiguration on Roadways/Ground Transportation.

Area	Length	Relevant Component	Potential Effects on Roadways/Ground Transportation
Keālia	4,600 ft.	Reconfiguring wires on Poles	Reconfiguring the electrical wires on poles that are within the road right-of-way will require short-term lane closures that will slow traffic through the area for periods of 1-3 days at a time. The work will be conducted during off-peak periods.
Keālia	340 ft.	Keālia Bridge	Attaching 12 kV and telecommunications lines to the bridge and reconfiguring electrical wires on poles will require short-term lane closures that will slow traffic through the area for periods of no more than a week days at a time. The work will be conducted during off-peak periods.
Keālia	3,300 ft.	Relocating Poles and Trenching	Trenching required for undergrounding will necessitate lane closures that will slow traffic through the area for a period of up 6 to8 weeks. The work will be conducted during off-peak periods and traffic control measures approved by the Department of Transportation will be employed. Nonetheless, delays of up to several minutes and slowdowns will almost certainly occur. The work will be conducted during off-peak periods and traffic control measures approved by the Department of Transportation will be employed.
Hanapēpē Port Allen Side of Hanapepe River	700 ft.	Segment H-3. Lowering transmission wires.	Lowering the dual circuit of transmission on poles that are within the road right-of-way will require short-term lane closures that will slow traffic through the area for a period of 1-2 weeks. The work will be conducted during off-peak periods and traffic control measures approved by the Department of Transportation will be employed.
Hanapēpē River to Intersection of Lele Rd.	1,800 ft.	Segment H-4. Lowering transmission wires.	Reconfiguring the electrical wires on poles that are within the road right-of-way will require short-term lane closures that will slow traffic through the area for a period of 1-2 weeks. The work will be conducted during off-peak periods.
Hanapēpē Town Bridge	500 ft.	Segment H-7. Lowering distribution circuit wires.	Reconfiguring the electrical wires on poles that are within the road right-of-way will require short-term lane closures that will slow traffic through the area for a period of 1-2 weeks. The work will be conducted during off-peak periods.
Kapa‘a	2,640 ft.	Segment C1. Lowering and flattening 12kV Circuit	Reconfiguring the electrical wires on poles that are within the road right-of-way will require short-term lane closures that will slow traffic through the area for periods of 1-3 days at a time. The work will be conducted during off-peak periods.
Kapa‘a	130 ft.	Segment C2. Attaching wire to Bridge	Attaching 12 kV and telecommunications lines to the bridge and reconfiguring electrical wires on poles will require short-term lane closures that will slow traffic through the area for periods of no more than a week days at a time. The work will be conducted during off-peak periods.

4.2.11 SOCIO-ECONOMIC EFFECTS

Implementation of the measures included in the HCP will add to KIUC's cost of operation. KIUC's anticipated expenditures on the minimization and mitigation measures that are in the proposed HCP average approximately $2.3 million per year (in 2010 dollars). When KIUC's internal costs for staff, special design features, and special coordination are taken into account, the amount approaches $2.5 million/year. This amount does not include the cost of special projects that KIUC is undertaking in order to avoid and/or minimize effects on the Covered Species. Neither does it include the added cost of the effort required to implement the activities described in Section 2.2.2.1.

On June 30, 2009, KIUC applied for a general rate increase to the State of Hawai‘i PUC (Docket No. 2009-0050) and included the costs of implementing HCP-related measures as anticipated at the time. When the PUC issued its Decision and Order on September 10, 2010, it granted KIUC permission to

recover $660,000 per year in its rates. As this is not sufficient to fund the HCP as now proposed, KIUC has committed to fund the difference by delaying other expenditures that the PUC approved.

Combining the estimated average annual HCP-related expenditures of $2.3 million per year with the "per million dollars" rate recovery requirements shown in Table 4.15 indicates that full recovery of the cost of HCP-related measures would require approximately $30 per year per average residential customer if it were treated as an operational expense. However, as only 29 percent of the cost is in the PUC-approved rates, the immediate effect on the average residential user will be substantially less ($8.50 per year).

Table 4.15. Rate Recovery Requirement of $1,000,000 Cost Increase

User Category	*Sale of Electricity*	*Kilowatt-Hours*	*No. of Cust.*	*Avg Customer Cost ($/Yr)*	*Avg Customer KWH /Yr*	*HCP Cost Recovery ($/Yr/Cust)*	*Change*
Residential - D	$67,521,772	160,479,367	27,323	$2,471	5,873	$12.94	0.52%
Commercial - G	$27,098,626	61,762,667	4,310	$6,287	14,330	$31.58	0.50%
Commercial - J	$23,757,990	57,561,387	358	$66,363	160,786	$354.32	0.53%
Large Power - L	$20,939,501	52,082,601	16	$1,308,719	3,255,163	$7,173.27	0.55%
Large Power - P	$48,260,251	118,083,102	109	$442,755	1,083,331	$2,387.29	0.54%
Street Lighting	$1,457,504	2,637,376	3,460	$421	762	$1.68	0.40%
Irrigation	$415,411	1,184,017	3	$138,470	394,672	$869.72	0.63%
2008 Total	***$189,451,055***	***453,790,517***	***35,579***	***$5,325***	***12,754***	***$28.11***	***0.53%***

Note: User categories are defined in Rule No. 10, Rates and Optional Rates as follows:

"Residential D" consists of single-family residences.

"Commercial G" consists of consumers whose demand does not exceed 30 kilowatts and whose energy consumption is less than 10,000 per month.

"Commercial J" consists of customers whose demand is >30 kilowatts but <100 kilowatts.

"Large Power L" consists of customers whose demand exceeds 100 kilowatts and whose use is measured at primary voltage.

"Large Power P" consists of customers whose demand exceeds 100 kW and whose use is measured at secondary voltage.

"Street Lighting" is applicable to public street and highway lighting service.

"Irrigation" consists of users of power for irrigation who agree to interruptions in their power supply.

Source: KIUC

In general, the increased revenue needed to fund the measures in the HCP will not increase customer costs to the point that it is likely to cause significant adverse socio-economic effects. The expenditures for HCP-related activities will generate some employment and business income within the Kaua'i community. However, because all of that must be funded by ratepayers on the island, it will not represent a net gain to Kaua'i's economy; instead the expenditures will simply reallocate existing resources away from other purposes and into habitat conservation.

4.2.12 IMPACTS ON MINORITY AND LOW-INCOME PERSONS OR POPULATIONS

Executive Order 12898 requires federal agencies to take appropriate steps to identify and avoid disproportionately high and adverse effects of federal actions on the health and surrounding environment of minority and low-income populations. All federal programs, policies, and activities that substantially affect human health or the environment shall be conducted to ensure that the action

does not exclude persons or populations from participation in, deny persons or populations the benefits of, or subject persons or populations to discrimination under such actions because of their race, color, income level, or national origin. The Executive Order was also intended to provide minority and low-income communities with access to public information and public participation in matters relating to human health and the environment.

The Council on Environmental Quality (CEQ) has issued guidance to federal agencies to ensure that environmental justice concerns are effectively identified and addressed throughout the NEPA process. USFWS guidance recommends that pathways or uses of resources that are unique to a minority or low-income community be considered before determining that there are no disproportionately high and adverse impacts on the minority or low-income population. The State of Hawai‘i has also developed its own legislation and guidance related to environmental justice. Act 294 was signed by Governor Lingle in July 2006 to define environmental justice in the unique context of Hawai‘i and to develop and adopt environmental justice guidance that addresses environmental justice in all phases of the environmental review process. The Environmental Protection Agency working with the Enforcement Subcommittee of the National Environmental Justice Advisory Council has developed technical guidance for conducting environmental justice assessments. Much of this guidance is concerned with identifying low-income and minority populations based on the location of the Proposed Action. Suggested measures include identifying areas as low-income if more than 20 percent of the affected area is below poverty level or identifying areas as minority areas if minority populations represent more than 15.72 percent of the total population.

The ethnicity data for Kaua‘i in Table 3.7 shows that the island has a mixture of ethnic groups that, with a few exceptions, is similar to that of the state as a whole. At 26.7 percent, Caucasians are slightly more common than the statewide average of 20.4 percent, and Japanese are less common on the island than the state average (11.6 percent on Kaua‘i versus 17.5 percent statewide). All others are within a few percentage points of the statewide average.

Typically, minorities are defined as individuals who are African Americans, American Indians, Alaskan Natives, Asians, Hispanics, Native Hawaiians, or Other Pacific Islanders. However, as recognized in the Hawai‘i Environmental Justice Initiative Report (Kahihikolo 2008), the minority population distribution of Hawai‘i differs greatly from that of the continental U.S. In contrast to the continental U.S., where Caucasians account for the majority of the population, no racial group comprises much more than a quarter of the Kaua‘i population. Kaua‘i (and the state in general) is also unique in that roughly one-fifth of the population reported multiple races; only 2.4 percent did so in the continental U.S.

U.S. Census data for 2006-2008 indicates that approximately 8 percent of the island’s population had incomes that were at or below the poverty level (see Table 4.16).[39] This is very similar to the rates in the County of Maui (7.9 percent) and in the City and County of Honolulu (8.2 percent). It is only three-fifths of the 13.4 percent in Hawai‘i County. By way of comparison, the poverty rate for the State of Hawai‘i and the nation as a whole are 8.8 percent and 13.2 percent.

[39] Table B17002. Ratio Of Income To Poverty Level In The Past 12 Months - Universe: Population For Whom Poverty Status Is Determined. Data Set: 2006-2008 American Community Survey 3-Year Estimates. Survey: American Community Survey. Low-income populations are defined using the poverty thresholds as defined by the U.S. Census Bureau.

Table 4.16 Ratio of Income to Poverty Level: Kaua'i County.

Ratio of Income to Poverty Level	*No. of People*	*Percent of Population*
Under .50	1,882	3.0%
.50 to .74	1,532	2.5%
.75 to .99	1,548	2.5%
1.00 to 1.24	1,969	3.2%
1.25 to 1.49	1,986	3.2%
1.50 to 1.74	2,093	3.4%
1.75 to 1.84	741	1.2%
1.85 to 1.99	1,854	3.0%
2.00 to 2.99	13,403	21.6%
3.00 to 3.99	11,193	18.0%
4.00 to 4.99	8,080	13.0%
5.00 and over	15,797	25.4%
Total:	***62,078***	***100.0***

Source: Table B17002. Ratio Of Income To Poverty Level In The Past 12 Months - Universe: Population For Whom Poverty Status Is Determined. *Data Set: 2006-2008 American Community Survey 3-Year Estimates. Survey: American Community Survey*.

Using this approach, the activities covered by KIUC's HCP and its alternatives were evaluated for their impact on the human environment and compliance with EO 12898 to ensure environmental justice. The activities under the Proposed Action would not pose significant risks to human health or their environment. While there are low-income and minority persons living in Kaua'i County, none of the activities under any of the alternatives would result in any adverse or disproportionate environmental impacts to minority or low-income persons or populations. There would be little or no change to KIUC's management of its activities under the HCP or the alternatives. It is not anticipated that implementation of the Proposed Action would increase or decrease the number of individuals employed permanently or seasonally by KIUC and result in an adverse or disproportionate impact to minority or low-income persons or populations. Some additional seasonal employees may be hired by KIUC or their contractors, as necessary, to implement certain mitigation actions. No persons will be displaced as a result of activities associated with the HCP. Those activities are not expected to result in substantial environmental, human health, or economic impacts on surrounding populations, including those classified as low income or minorities.

4.2.13 CUMULATIVE IMPACTS

Cumulative impacts are those that result from the incremental impacts of the proposed actions when added to other past, present and reasonably foreseeable future actions. Such impacts can result from individually minor, but collectively significant actions taking place over a period of time. In the present case, the time is limited to the five years during which the HCP and associated ITP would be in effect. For reasons summarized below, the additional minor facilities that KIUC would develop and activities that it would continue over the term of the ITP are unlikely to cause significant cumulative impacts so long as the mitigation measures provided for are implemented as planned.

- *Cumulative Impacts on Topography and Soils*. KIUC's future additional minor facilities involve minimal changes to topography or soil disturbance, and even these are widely distributed both geographically and temporally. The additional facilities for which it is seeking coverage involve

more focused activities, but even these are modest in scale (disturbing no more than a few acres of ground) and in areas that are not used for agricultural activities or where soil loss would be a significant issue. Similarly, the mitigation measures that it is proposing have little potential for significant effect on soils or topography and, therefore, little ability to contribute in a meaningful way to cumulative impacts on these resources.

- *Cumulative Hydrologic Impacts*. The nature of KIUC's future minor projects is such that they have no potential to cause substantial cumulative hydrologic effects. The somewhat larger capital improvement projects (CIP) that are included in the HCP (the Aepo Substation, the North Shore Reliability Enhancement Project, and the Kapaia Power Station Generation addition) are all geographically separated from one another and so do not affect the same hydrologic resources. Moreover, none of these projects are located in an area where there is other substantial development or activity that might cause significant cumulative effects. Finally, the minimization and mitigation activities that KIUC has proposed as part of its HCP do not involve the use of water, changes to topography that would alter drainage patterns, or other changes that would increase the volume or decrease the quality of runoff. On the contrary, the activities that will be undertaken in protecting seabird colonies is likely to reduce non-native animal populations that have led to increased soil erosion/decreased water quality in the watersheds.
- *Cumulative Climate, Weather, and Air Quality Impacts*. KIUC's future minor activities (e.g., new connections within existing service area, electrical equipment additions to existing substations and switchyards, mechanical and electrical equipment installations at existing facilities, installation of fiberoptic cable, and in-situ replacement of existing lines or other facilities) have no potential to cause substantial cumulative climate, weather, or air quality impacts. With the exception of the Kapaia Power Station Generation addition, none of the other CIP projects that are included in the HCP involve emissions or other changes or activities that have the potential to affect climate or air quality in a meaningful way. That exception will burn fossil fuels, but modeling that includes emissions from all existing and proposed sources shows that emissions and ambient air quality will comply with all applicable air quality standards (Planning Solutions, Inc., 1999). As noted in the discussion of air quality impacts, KIUC expects to offset carbon and other greenhouse gas emissions by substituting non-carbon emitting power sources for fossil fuel-fired generation that it now uses. As a result, its cumulative contribution to global warming will decrease over time.
- *Cumulative Impacts on Sound Levels*. With the exception of the Kapaia Generating Station addition, none of the long-term activities that would be authorized under the ITP/ITL are significant sound sources. Construction activities associated with the development of new facilities produce louder noises, but these are short-term and generally would not contribute measurable to cumulative effects on sound levels. The Kapaia unit addition would increase noise levels on and around that facility, but the site is isolated from noise-sensitive uses, and the analyses conducted when the complex was first being developed showed that it would comply with all applicable noise standards (Planning Solutions, Inc., 1999).
- *Cumulative Impacts on Flora*. As discussed above in the Section 4.2.5.1, none of the KIUC activities that would be covered under the HCP have the potential to affect flora in any significant way. Hence, they do not have the potential to cause measurable cumulative impacts on flora. The mitigation measures that are discussed in Section 4.2.5.2.2 would help exclude ungulates and other large animals from a substantial area within breeding colonies of the Covered Species. This would help reduce the spread of invasive plant species and preserve native vegetation.
- *Cumulative Impacts on Fauna*. As detailed in Section 3.3.2, many factors, from introduced plants and animals, hurricanes, to light attraction from facilities owned or operated by KIUC and others, have, are, and will likely continue to, impact the native fauna on Kaua'i. The SOS Program provides the best information relating to cumulative impacts occurring to covered and non-covered species. The number of Newell's shearwater individuals retrieved through the SOS Program has declined over the past several decades (approximately 1,000 annually in the 1980's, and less than

300 per year since 2000). The proportion of this decline due to population reductions or due to minimization of light attraction is not clear. However, data collected using marine radar surveys suggests, at least for the Newell's shearwater, that much of the reduction is due to a proportional population decline. Under the Proposed Action, the take of Covered Species and the impacts to non-covered species anticipated due to KIUC facilities are expected to continue to decline as it implements more minimization measures. In addition, mitigation actions will reduce adult mortality and increase reproductive success within managed colonies, helping to achieve recovery goals of listed species. Given the limited number of new facilities that KIUC would construct or install during the 5-year term of the proposed HCP, along with the minimization and mitigation actions that would be implemented, the impacts of the Proposed Action are expected to reduce the cumulative negative impacts occurring to the Covered Species or other fauna on the island. Other light attraction impacts occurring throughout the island are expected to continue throughout the term of the proposed ITP. However, the island-wide seabird HCP is expected to be completed prior to the termination of KIUC's short-term HCP and, if approved, would implement actions to benefit the Covered Species with the intent of continuing and expanding some of the conservation measures initiated under KIUC's HCP.

- *Cumulative Impacts on Scenic Resources*. KIUC facilities are constructed and operated solely to serve the needs of Kaua'i's people and businesses. Under the terms of its charter from the PUC, the Cooperative must provide service where requested by potential customers. In general, all of the people and businesses on Kaua'i (nearly all of whom are part owners of the cooperative) prefer public infrastructure (such as electrical power lines) to be out of sight (i.e., below ground). However, because only a portion is willing and able to pay the cost premium that undergrounding facilities necessitates, KIUC expects to continue installing some above-ground electric lines and other electrical facilities, and these will inevitably detract from the natural, uncluttered landscape that most individuals prefer.
- *Cumulative Impacts on Historic, Archaeological, and Cultural Resources*. As the measures that are part of the HCP have been determined not to have a significant effect on historic, cultural, or archaeological resources, there is no potential for cumulative effects on these resources.
- *Cumulative Impacts on Existing Land Use*. As the measures that are part of the HCP have been determined not to have a significant effect on existing land use, there is no potential for cumulative land use effects.
- *Cumulative Impacts on Public Infrastructure and Services*. The electrical service that KIUC provides is a necessity for nearly all of the other human activity that occurs on the Kaua'i. Where most other actions place a burden on the electrical system, the activities and facilities that would be covered under the requested ITP are intended to support the proper functioning of that electrical infrastructure. As the operation of the electrical facilities that would be allowed under the ITP place little or no burden on other public infrastructure, there is no potential for cumulative adverse effects.

4.3 IMPACTS OF THE ALTERNATIVE PERMIT TERM

Under the Alternative Permit Term Alternative, which involves the issuance of an ITP with a 3-year term rather than a 5-year term, all anticipated effects described under the Proposed Action that would occur during the first 3 years after permit issuance as discussed. However, under this scenario, the take of Covered Species due to KIUC's continued activities after the third year would not be authorized by the proposed ITP and additional coverage would need to be obtained via an amendment or under an ITP issued through an independent HCP developed by KIUC by that time (if the KSHCP has been approved and ITPs issued, KIUC's impacts will either be covered under that HCP, or the take occurring will once again be unauthorized and in violation of the ESA). Uncertainty exists in both the estimation of the impacts to Covered Species occurring due to KIUC's activities, and the feasibility of achieving the increases in survival and reproduction of the Covered Species needed

from the colony management to offset KIUC's impacts. Therefore, the potential exists that a site to conduct the minimization and mitigation as proposed during years 4 and 5 will not be available. There is currently no agreement in place with the landowner of Wainiha Valley and additional sites to implement management actions that could benefit the Covered Species have yet to be identified. Therefore, the location and specific management actions that will be required to benefit Covered Species cannot be determined with certainty until more information is obtained. The additional information that would be collected and analyzed as part of both the Proposed Action and the Alternative Permit Term Alternative would be available within one year and could be used to develop an HCP using fewer assumptions and with less uncertainty.

As with the Proposed Action, the cumulative impacts resulting from the incremental impacts of the actions included under the Alternative Permit Term Alternative, when added to other past, present and reasonably foreseeable future actions are unlikely to cause significant cumulative impacts so long as the mitigation measures provided for are implemented as planned.

4.4 COMPARISON OF ALTERNATIVES WITH THE NO-ACTION ALTERNATIVE WITH REGARD TO COVERED SPECIES IMPACTS

The differences in impacts between alternatives to all resources assessed, with the exception of Covered Species, are considered negligible. Therefore, this section only compares the impacts to Covered Species of the feasible action alternatives with impacts of the No-Action Alternative.

4.4.1 PROPOSED ACTION COMPARED TO NO-ACTION

The No-Action Alternative is not considered a feasible alternative as it results in continued illegal take of the Covered Species. It is estimated that the annual amount of take under the No-Action Alternative is 180 Newell's shearwater, 2 Hawaiian petrel, and 2 band-rumped storm-petrel reduced by the effects of whatever avoidance and minimization measures KIUC may implement. KIUC would not implement colony management or research as proposed under the Proposed Action, although the funds in the escrow account established under the plea agreement would be available under both the Proposed Action and No-Action Alternative. Even though KIUC would not be required to implement the SOS Program under the No-Action Alternative, because it has voluntarily funded the implementation of the SOS Program since 2003, it will likely continue regardless of ITP issuance.

Under the Proposed Action, up to a 5-year period of take would be authorized before KIUC would need to obtain long-term take authorization. While KIUC's commitment to implement most of the power line reconfiguration projects included in the Proposed Action under its plea agreement with DOJ means that the impacts of those projects will occur under both the Proposed Action and the No-Action Alternative, the level of take anticipated under the Proposed Action will still be lower than under the No-Action Alternative because of the additional avoidance and minimization measures KIUC will implement under the Proposed Action through proposed implementation of reconfiguration of segments H-3 and H-4 in Table 2.4. However, the reductions in take due to those actions cannot be quantified because the amount of take due to specific line segments have not been determined.

Implementation of the colony management under the Proposed Action will reduce predation on the Covered Species and, therefore, reduce adult mortality and increase reproductive success compared to the No-Action Alternative. Habitat improvements for Covered Species, such as invasive plant species control, will increase habitat availability for future nesting opportunities, which will not occur under the No-Action Alternative, except for whatever actions could be implemented using the escrow account KIUC established under its plea agreement with DOJ. The increases in survival rates and reproductive success of the Covered Species that are expected due the colony management efforts will require long-term monitoring before they can be quantified. Moreover, all known locations where specific management actions that will benefit Covered Species are included under the Proposed

Action. The monitoring that would be conducted in the nesting colonies where management will be implemented under the Proposed Action will provide information regarding the benefits that can be achieved and reduce the uncertainty involved in long-term planning. In addition, research to be conducted under the Proposed Action will provide updated population estimates for Newell's shearwater and Hawaiian petrel that are critical for confirming assumptions made about the population trends that have occurred since the population estimates conducted in 1995 (Spear et al. 1995). Auditory surveys for additional nesting colonies of Covered Species to be conducted under the Proposed Action are expected to identify more opportunities where beneficial management measures can be implemented. Benefits to the Covered Species resulting from implementation of the SOS Program under the Proposed Action cannot be determined until further research to assess whether birds that are processed through the program survive and return to breed is conducted. However, over 90 percent of the birds retrieved through the program are released back to the wild and have at least an additional chance at survival that would not otherwise occur.

4.4.2 ALTERNATIVE PERMIT TERM COMPARED TO NO-ACTION

The No-Action Alternative is not considered a feasible alternative as it results in continued illegal take of the Covered Species. It is estimated that the annual amount of take under the No-Action Alternative is 180 Newell's shearwater, 2 Hawaiian petrel, and 2 band-rumped storm-petrel reduced by the effects of whatever avoidance and minimization measures KIUC may implement. KIUC would not implement colony management or research as proposed under the Alternative Permit Term Alternative, although the funds in the escrow account established under the plea agreement would be available under both the No-Action and Alternative Permit Term Alternatives. . Even though KIUC would not be required to implement the SOS Program under the No-Action Alternative, because it has voluntarily funded the implementation of the SOS Program since 2003, it will likely continue regardless of ITP issuance. Under the Alternative Permit Term Alternative, only a 3-year period of take would be authorized before KIUC would need to obtain long-term take authorization.

The estimated annual amount of take that would be anticipated under the Alternative Permit Term Alternative will be lower than under the No-Action Alternative because of the avoidance and minimization measures KIUC will be required to implement under the ITP. As discussed above, the reductions in take due to those actions cannot be quantified at this time. However, as the line segments that KIUC would be required to modify under a 3-year ITP include many of those identified by Ainley et al. (1995) as having the highest collision risk, the take reduction could be substantial.

Implementation of the colony management under the Alternative Permit Term Alternative will reduce predation on the Covered Species and therefore reduce adult mortality and increase reproductive success. Habitat improvements for Covered Species, such as invasive plant species control, will increase habitat availability for future nesting opportunities, which will not occur under the No-Action Alternative, although the funds in the escrow account established under the plea agreement would be available under both the No-Action and Alternative Permit Term Alternatives. The increases in survival rates and reproductive success of the Covered Species that are expected due the colony management efforts will require long-term monitoring before they can be quantified. The Alternative Permit Term Alternative provides for colony management at all of the locations where specific management actions that will benefit Covered Species included in the Proposed Action except for Wainiha Valley (where colony management is proposed during the fourth and fifth years under the Proposed Action). The monitoring that would be conducted in the nesting colonies where management will be implemented under the Alternative Permit Term Alternative will provide information regarding the benefits that can be achieved and reduce the uncertainty involved in long-term planning. In addition, research to be conducted under the Alternative Permit Term Alternative will provide updated population estimates for Newell's shearwater and Hawaiian petrel that are critical for confirming assumptions made about the population trends that have occurred since the population estimates conducted in 1995 (Spear et al. 1995). Auditory surveys for additional nesting

colonies of Covered Species to be conducted under the Alternative Permit Term Alternative are expected to identify more opportunities where beneficial management measures can be implemented.

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6.0 LIST OF AGENCIES, ORGANIZATIONS, AND PERSONS CONTACTED

This list includes agencies, organizations, and persons contact during preparation of the HCP and this environmental assessment.

Federal Agencies

U.S. Fish and Wildlife Service (USFWS)
Environmental Protection Agency (EPA)
National Marine Fisheries Service (NMFS)
U.S. Army Engineer Division
U.S. Geological Survey (USGS)

State Agencies

Department of Land and Natural Resources (DLNR), Division of Forestry and Wildlife (DOFAW)
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APPENDIX A. ARCHAEOLOGICAL MONITORING PLAN FOR KEALIA

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Archaeological Monitoring Plan for Keālia Beach Corridor Transmission Line at Kūhiō Highway, Keālia Ahupua'a, Kawaihau District, Kaua'i*

Krickette Murabayashi Thomas S. Dye, PhD

August 20, 2010

Abstract

At the request of Planning Solutions, T. S. Dye & Colleagues, Archaeologists has prepared an archaeological monitoring plan for Kūhiō Highway, Keālia Ahupua'a, Kawaihau District for ground-disturbing activities associated with the construction of the Keālia Beach Corridor Transmission Line. The plan calls for on-site monitoring of trenching for installation of underground utility lines inland of Keālia Beach and for on-call monitoring of boring of new utility pole locations if these are needed south of Keālia Beach. Archaeological monitoring will focus on the identification of the presence or absence of cultural deposits and treating identified sites properly.

Contents

*Prepared for Planning Solutions, Ward Plaza, Suite 330, 210 Ward Avenue, Honolulu, HI 96814.

1 Introduction

At the request of Planning Solutions, T. S. Dye & Colleagues, Archaeologists has prepared an archaeological monitoring plan (AMP) for the reconfiguration of the Keālia Beach Corridor Transmission Line at Kūhiō Highway in Keālia, Kauaʻi. The AMP has been written to conform to the State Historic Preservation Division (SHPD) *Rules Governing Standards for Archaeological Monitoring Studies and Reports*.

Kauaʻi Island Utility Cooperative is now working on the second phase of its reconfiguration of electrical power lines near Keālia Beach on the island of Kauaʻi. The purpose of the reconfiguration project is to reduce the number of overhead wires and wire layers in order to reduce the likelihood that endangered seabirds will collide with the lines. In order to accomplish this, Kauaʻi Island Utility Cooperative proposes to place the 12kV distribution circuit and telecommunications lines owned by others underground and in conduits attached to the highway bridge over Keālia Stream from Mailihuna Road to Kaao road. Completing this work will involve trenching as well as attaching electrical cable to the bridge over Keālia Stream. The underground design involves the installation of eight Kauaʻi Island Utility Cooperative access vaults (each approximately 5 × 7 ft.), seven Hawaiian Telephone access boxes (each approximately 4 × 6 ft.), two pad mounted switchgear units, and one pad mount transformer and excavation of approximately 3,300 linear feet of trench. The extent of the proposed trenching work is restricted to Segment D2, located near sea level behind Keālia Beach (fig. 1). Placement of the telecommunications and 12kV electrical lines underground will allow the number of utility poles to be decreased, but this will involve relocation of a few of the poles. The entire design will be within the State Right-of-Way. In addition, to the

work immediately fronting the Keālia Beach, Kauaʻi Island Utility Cooperative will reconfigure the overhead electrical lines within the Kūhiō Highway right-of-way for a distance of approximately 4,600 feet southward from Mailihuna Road (fig. 2). For the most part it will continue to use the existing poles, and so no ground disturbance will be needed. In a few instances, however, technical considerations may require it to relocate utility poles. If this occurs, new borings, each of which would disturb no more than a few square feet, could be needed.

Figure 1: Location of Segment D2, Keālia Beach Transmission Corridor. Map courtesy of Planning Solutions.

This AMP calls for on-site archaeological monitoring during excavation of the Keālia Beach Transmission Corridor in Segment D2 where there is a relatively high probability of encountering buried historic properties. The plan proposes on-call monitoring during possible boring of new utility pole locations in Segment D1, where there is a low probability of encountering buried historic properties.

2 Background

This section reviews the physical environment, land history, and archaeological investigations in the vicinity of the undertaking to give context for the project and to determine the types of historic properties likely to be encountered during the undertaking.

Figure 2: Location of Segment D1, Keālia Beach Transmission Corridor. Map courtesy of Planning Solutions.

2.1 Physical Environment

The topography of the Keālia Beach Transmission Corridor area was primarily influenced by Keālia River. According to the USDA Natural Resources Conservation Service Web Soil Survey,[1] soils found along the Keālia Beach Transmission Corridor were composed of nearly level, very slow to rapidly draining soils suitable for pastureland and some agriculture. Along the northern upland portion of the corridor, in the vicinity of Kaao Road, the soils are described as Lihue Silty clay 0 to 8 percent slopes (LhB). This series consists of well-drained soils found on the uplands. The majority of the Keālia Beach Transmission Corridor, mauka of Kūhiō Highway, comprises Mokuleia fine sandy loam (Mr). This series consists of well-drained soils found along the coastal plains and formed in recent alluvium deposited over coral sand. The makai side of Kūhiō Highway along Keālia Beach is composed of light-colored calcareous beach sand. Along the southern drainage of Keālia Stream, the soils include Mokuleia clay loam (MtA), and Lihue silty clay, 25 to 40 percent slopes (LhE2).

[1] http://websoilsurvey.nrcs.usda.gov

2.2 History

Legendary accounts associated with the area are few. One legend associated with Keālia involves Hiʻiaka and Wahineʻōmaʻo stopping near Keālia on the way to Hāʻena to help a man cook his luau, and Hiʻiaka healing an ailing woman with a prayer [15:14]. Another legend involves a *wahi pana* in the *mauka* region of Keālia called Waipaheʻe. According to the legend, two boys, Kaweloleimakua and Kauahoa, go to the slide at Waipaheʻe and engage in two competitions. The first was to see who could make the best *lei* and the second tested who could urinate the longest. Kauahoa was bested by Kaweloleimakua in both contests. Later, when the men are grown and opposed in war, Kawelo mentions it in a fruitless attempt to peaceably end the conflict [17:86].

Surrounding *ahupuaʻa* are named as legendary homes of *aliʻi*, who were likely attracted to the good soil and flowing streams of the area. Keālia Ahupuaʻa, however, was not so favorably described:

> Two small *ahupuaʻa*, Kamalomaloʻo (Dry Kamalo) and Kealia are rather dry, with small streams and gulches and only a few *loʻi* areas. Where Kealia and Kapaʻa Streams join inland there are wide flats that were terraced. Seaward there were formerly many terraced areas. There are clumps of *coconut* and mango trees where formerly were *kuleana* with their *loʻi*. Inland there were a number of small streams which doubtless once had small *loʻi* developments. [8]

Documentation of *pre-contact* land use in Keālia is sparse. However, clues to activities that may have occurred prior to *Contact* can be gleaned from observations made by early Europeans. In a missionary census of the 1830s, 265 adults and 18 children were recorded in Keālia [16:25]. Although one of the less attractive regions of the area, it is still likely that Keālia hosted inhabitants who were well supported, as the *loʻi* and terraces witnessed there may indicate.

Land Commission Award claims are also revealing of the land use at Keālia. At the *Māhele*, Keālia Ahupuaʻa was awarded to Mikahela Kekauonohi.[2] Within Keālia, small portions were awarded to various claimants. One claimant, Kiaipa, made a claim for a small piece of land in TMK: 4–7–003:006, *makai* of Kūhiō Highway, near the coast, on which he had two *loʻi* and *kula*. *Mauka* of Kūhiō Highway, he made claims for two other pieces of land, on which he had *kula*, three more *loʻi*, and a house lot.[3] Other claims are listed in table 1 below. The *Māhele* information indicates that there were coastal and inland habitations, as well as agricultural use in the area.

In a narrative, Damon [3] describes some of the activities occurring in Keālia during the late nineteenth century. Circa 1860, Ernest Krull, a German national, established a large dairy farm in Keālia located "on the hill where now the belt road turns directly eastward toward Anahola and the road continuing to the north through the fields leads to the famous slide of Waipahee Falls" [3:358]. According to records at the Bureau of Conveyances, Krull had obtained lands in Keālia, including LCAs 8842, 10906, and 10660, through several deeds in the 1860s and 70s.[4] Around the same time, August Conradt was sent by Hoffschlaeger and Company to start a cotton plantation in Keālia. The effort, however, was short-lived because of an inability to compete with cotton production in

[2] Land Commission Award (LCA) 11216*K, RP 5680.
[3] LCA 8833.
[4] Liber 29, Page 284; Liber 46, Page 291; and Liber 46, Page 408.

Table 1: Land Commission awards in Keālia Ahupuaʻa

LCA No.	Claimant	Claim
08833	Kiaipa	5 *loʻi*, *kula*, house lot
08834	Kalawaia	2 *loʻi*, *kula*, house lot
08842	Kaawapupuole	4 *loʻi*, *kula*, house lot
10148	Mamaki	2 *loʻi*, *kula*, house lot
10149	Makuahine	3 *loʻi*, *kula*, house lot
10628	Puhi	1 *loʻi*, house lot
10473	Nahi	20 *loʻi*, *kula*, house lot
10906	Umiumi	2 *loʻi*, *kula*, house lot
10907	Umiumi	2 *loʻi*, *kula*, house lot
11216K	Kekauonohi	claim on Keālia Ahupuaʻa
01980	Puali	4 *loʻi*, *kula*, house lot
03413B	Kaaki	11 *loʻi*, *kula*, house lot
07966	Keaonui	3 *loʻi*, *kula*, house lot
08060	Hulialo	2 *loʻi*, *kula*, house lot
08061	Hainau	4 *loʻi*, *kula*, house lot
10660	Pakaa	42 *loʻi*, *kula*, 2 house lots
10689	Puukuakahi	4 *loʻi*, *kula*, house lot

the southern states of the U.S. The absence of marked seasonal changes in Hawaiʻi resulted in the coinciding of young and mature blossoms which made harvesting difficult and costly [3:376].

2.2.1 Makee Plantation

The Reciprocity Treaty of 1875, which allowed Hawaiian sugar free access to the American market, greatly affected Keālia. On Maui, Captain James Makee and his son-in-law and business partner Colonel Zephaniah Spalding planned to get into the sugar business. The two held close ties with King Kalākaua, who in 1877, began to take an interest in sugar too. Kalākaua established one of the first colonies of Hawaiian homesteaders called the Hui Kawaihau, sending them over to Kauaʻi with Makee and Spalding, who had acquired 11,000 ac. of agricultural land in Kawaihau (Puna) District [13:3]. Krull had deeded land in Keālia to Makee Sugar Co. in April 1877.[5]

Members of Hui Kawaihau planted the first cane for Makee Sugar Company. Captain Makee had obtained permission from the king to build a mill at Kapaʻa by agreeing to grind the cane grown by Hui Kawaihau [3; 5]. Hui Kawaihau cultivated the land of Kapahi above Keālia and Kapaʻa *ahupuaʻa* [3:735]. To start up their sugar endeavor in Kauaʻi, "Spalding built a processing plant in Keʻalia and Makee constructed a mill at the north end of Kapaʻa" [13:3]. According to Earl Arruda, a former president of the Kauaʻi Historical Society who conducted research on Keālia for the "Kapaʻa School Centennial Book 1883–1983," Spalding purchased the land from Ernest Krull [13]. Another source says that Makee, along with King Kalākaua and "several prominent businessmen," purchased the land from Krull, and following Makee's death in 1878, Spalding purchased majority interest of the land.[6] Records at the Bureau of Conveyances seem to confirm the latter, as they indicate that

[5] Liber 50, Pages 146–147.

[6] Hawaiian Sugar Planters' Association Plantation Archives, University of Hawaiʻi at Mānoa Library, Hawaiian Collection, `http://www2.hawaii.edu/~speccoll/p_lihue.html`.

the lands that had been deeded from Krull to Makee Sugar Co. in April of 1877 were deeded to Spalding in December of the same year, presumably following Makee's death.[7]

A different source places Captain Makee's death in 1879 [13], but regardless, upon his passing, Makee's son-in-law Colonel Spalding became master of the plantation and focused its operations in Keālia.

> [Spalding] had obtained title to the ahupuaa of Kealia, a large tract of fine cane land adjoining Kapaa; and it was not long before Spalding, who had already built a second mill at Kealia, a mile and a half from the Kapaa Mill, tore down the latter and transferred all the milling operations of the two plantations to Kealia, and later the two plantations were combined under the original name of the Makee Sugar Company. [5]

Unlike his father-in-law, Spalding had no interest in the Hui Kawaihau, and by 1881, the Hui members had left the land and let the property and leasehold rights pass to Colonel Spalding [5].

The Makee Plantation continued to operate under Spalding until World War I, when Spalding began thinking of retirement and subsequently sold 51% interest in his operations to American Factors. By 1921, he had sold off all his property and gone to California to be with his sons [13]. In 1933, Makee Plantation was completely taken over by Lihue Plantation, at which time it had "7200 acres in cane with another 2200 acres planted by independent planters" [18].

2.3 Archaeological Background

Several archaeological investigations have been in the vicinity of the proposed Keālia Beach Transmission Corridor, but none within the corridor itself.

One of the earliest recordings of *site* information was by Wendell Bennett during his survey of the island of Kauaʻi in 1928–1929 [1]. He recorded only two sites in the vicinity of Keālia, but none within Keālia Ahupuaʻa.

Site 111 Ditch, south of the Keālia Valley, inland. "A large simple dirt ditch, about 6 feet in width and of varying depths."

Site 112 "Kawelomamaia *heiau*, said to have been located where the Kawelomamaia stream runs into the sea north of Kealia."

Since Bennett's study, several archaeological investigations have been conducted in Kapaʻa and Keālia in the vicinity of the proposed Keālia Beach Transmission Corridor. These studies have documented several historic properties of the area and have provided information on previous land alterations which have occurred as a result of the late nineteenth century activities including ranching and commercial sugar cultivation (fig. 3, table 2).

2.3.1 Historic Properties near Segment D2

Five known historic properties are located near the Keālia Beach Transmission Corridor: state sites 50–30–08–884, –789A, –1851, –2075, and –2074. Information for these sites has been documented in several studies; however, one archaeological investigation [2] is especially informative about these historic properties.

[7] Liber 54, Page 126.

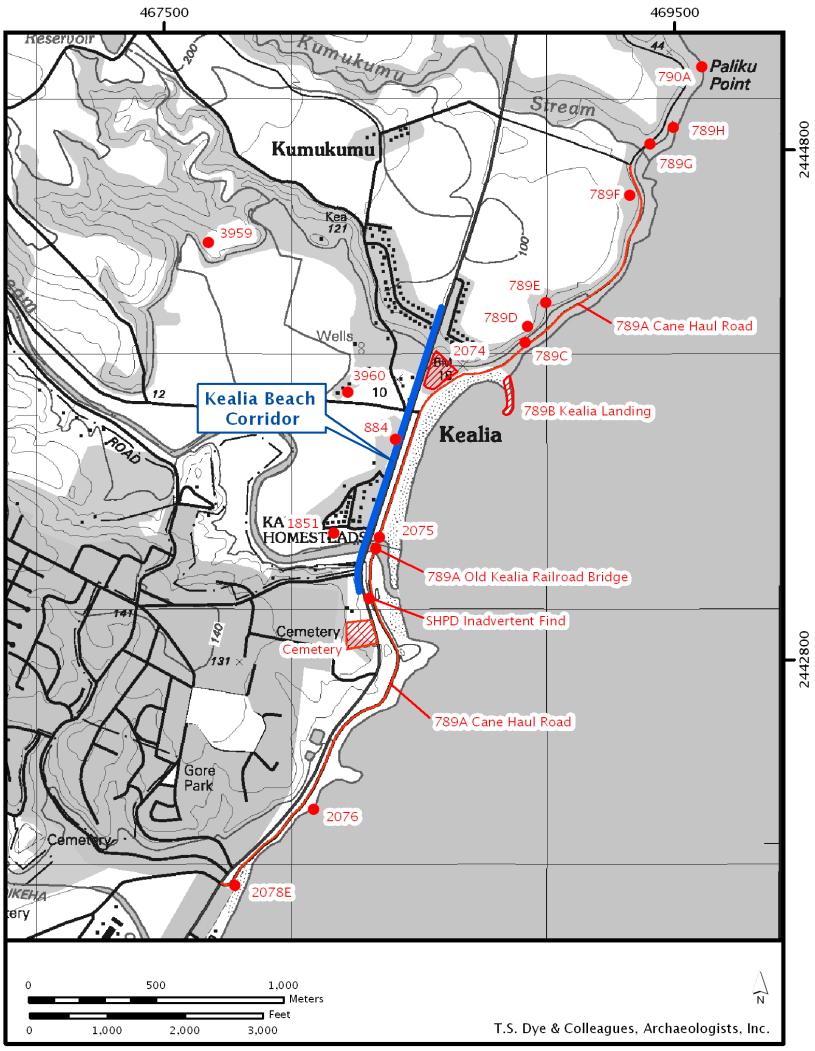

Figure 3: Historic properties located in the vicinity of the Keālia Beach Transmission Corridor.

In 2002, Bushnell et al. [2] conducted an archaeological inventory survey for a 4.3 mi. long by 12 ft. wide corridor for a bicycle and pedestrian path. The path would lie along a coastal route running from the south side of the Waiakea Canal at Lihi, north through Kapa'a and Keālia *ahupua'a* to 'Āhihi Point. It would connect a number of established paved and unpaved thoroughfares including segments of the historic Cane Haul Road (state site 50–30–08–789A). The survey identified a number of previously documented historic properties associated with plantation-era activities including roads and bridge foundations, piers and landings (state site 50–30–08–789 includes 14 features associated with plantation-era activities). These sites were previously assessed as signficant under criterion D for the information they could provide regarding plantation-era transportation, but the integrity of the features has been comprised through time. No further work was recommended for these sites.

Table 2: Historic Properties near the Keālia Beach Transmission Corridor and vicinity

Site No.*	Site Type	Interpretation
789A†	Cane Haul Road	Historic road, cane transport
789B	Keālia Landing	Sugar transport to ships
789C	Dynamite storage bunker	Used by sugar plantation
789D	Semi-circular terrace	Foundation for plantation-era structure
789E	Terrace	Plantation-era or recent garden terrace
789F	Stone-curbed trail segment	Recent trail segment
789G	Kumukumu Stream Bridge	Bridge associated with plantation-era railway and road
789H	Pier foundation	Plantation-era activities
790	Cement platform	WWII-era structures
884	Cultural deposit	Pre-contact habitation
1851	Human burial	Inadvertent discovery, two sets of human remains possibly pre-contact
2074	Cultural layer and human burial	Pre-contact and historic-era habitation, pre-contact burial
2075	Highway Bridge Foundation	Concrete foundations of old Keālia Belt Road
2076	Petroglyph	Modern petroglyph
2078E	Concrete railroad bridge foundation	Transportation
3959	Human burial	Single molar
3960	Human burial	Fragment remains of possible pre-contact burial

*State Site Nos. preceded by 50–30–08–.

†Bold face denotes historic properties near the Keālia Beach Transmission Corridor.

During the survey, the site of a proposed trail restroom, near the north end of Keālia Beach, was tested for subsurface cultural deposits. Eight backhoe trenches were opened which revealed the discontinuous layers of a berm and swale *topography*. A layer of "culturally enriched" *sand*, and various pit features were noted in the six trenches that were opened along the berm (state site 50–30–08–2074). An *in situ* burial was discovered in Trench 5 (site –2074 feature A), which represented a minimum of one young adult male. The deposit in which the individual was interred consisted of a pit feature that intruded through a layer of clean beach sand, a cultural layer, and a basal sand layer. Material that was screened from the cultural deposits yielded such artifacts as fish bone, shell *midden*, and bone fish hook blanks. The two trenches opened in the swale area revealed *fill* material overlying gleyed *clay* sediments. A single piece of charcoal from one of the cultural features was sent to Beta Analytic for ^{14}C dating. This sample dated this feature event to have occurred between approximately 1650–1960. The authors therefore interpret the site to be late prehistoric. This conclusion is reasonable given the recent radiocarbon age. Disturbance to the cultural layers, a lack of documentation of what feature the sample came from, and no identification of the wood charcoal taxa, however, limit the integrity of this interpretation. Site -2074 was determined to be significant for its information content (criterion D) and for having value to the native Hawaiian community due to association with cultural practices that were once carried out at the property (criterion E). This site was recommended for preservation.

The foundations for a historic bridge crossing on the north and south end of Keālia Stream, was newly identified during the survey (state site 50–30–08–2075). The remnant bridge foundations were assessed as significant under criterion D for their information content and no further work was recommended for this site.

Human burial sites (state site 50–30–08–1851) were previously recorded near the Keālia Beach Transmission Corridor. Human remains were inadvertently discovered during sand mining activities conducted by the Lihue Plantation Co., Ltd. in 1991. Hammatt and Folk [7] conducted a field inspection of a sand quarry site at Keālia, just inland of Kūhiō Highway, where human bones were inadvertently exposed. Hammatt and Folk indicated that burials are probable in the sand dune environment of Keālia and expressed a likelihood that the burials were related to LCAs 8842:2 and 10906:1. They also observed

> [c]ultural deposits which include historic artifacts and traditional Hawaiian midden remains are visible in the undisturbed ground around the subject pit mines as well as in the profile of the excavated pit at the *makai* extreme. Hammatt and Folk [7]

It was recommended that sand mining in the area cease and that a mitigation plan for the reburial of the remains be prepared.

In 1996, Jourdane and Collins [9] recovered fragments of human remains inadvertently discovered by an individual looking for bottles near the Kūhiō Highway bridge that crosses Keālia River. The remains were recovered also from the former Kealia Plantation Camp, an area which had been mined for sand (state site 50–30–08–1851). Because of the disturbed archaeological *context*, time since death could not be determined.

In 2003, archaeological monitoring of a proposed fiber optic duct line was conducted in the Keālia area. One historic site, site 50–30–08–884, was identified near the Keālia Beach Transmission Corridor. This cultural deposit was identified as a traditional habitation living surface, which was truncated by historic period activity associated with *sugarcane* cultivation in the area [4].[8]

2.3.2 Historic Properties North and South of Segment D2

Newly identified sites near Segment D1 include a petroglyph (state site 50–30–08–2076), located ca. 0.2 mi. north of the intersection of Kūhiō Highway and Kawaihau Road. It is described as a basalt *boulder* in the intertidal zone with "three dots arranged in a triangular *motif* with a spiral-shaped design adjacent to, and to the right of the dots" [2:87]. The authors assert that the condition of the petroglyph suggests that it is possibly of modern origin.

Other historic-era properties identified include the remains of concrete steps from the old beach pavilion at Kapaʻa Beach Park (state site 50–30–08–2077), and additional railway infrastructure including an alignment, railroad bridge, and foundation (state site 50–30–08–2078) [2].

In 1996, McMahon [12] conducted an archaeological inventory survey of approximately 9 ac. for a proposed YMCA building. Surface survey and subsurface testing were undertaken, and no significant historic sites were identified. It was determined that due to the terrain and pastureland use in the area, deeply buried features are unlikely, and no further archaeological work was recommended.

An historic-era cemetery is located just *mauka* of Kūhiō Highway and south of Kapaʻa Stream. According to Kikuchi and Remoaldo [10] the cemetery (B-002) appears to be a discrete historic cemetery although no other information on the cemetery was given.

[8] An inadvertent burial said to be located near Kawaihau Road and Kūhiō Highway was listed as site 50–30–08–884 by Bushnell et al. [2]. However, the site description and location could not be confirmed with SHPD.

Several historic properties, mostly related to plantation-era activities, have been recorded along the shoreline to the north of Keālia Beach Transmission Corridor. Perzinski, McDermott, and Hammatt [14] executed an archaeological inventory survey with subsurface testing of a 300 ac. Keālia *Makai* parcel in 2000. The survey area included all lands *makai* of Kūhiō Highway between Anapalau Point and Keālia Landing and included backhoe trenching of "Donkey Beach." Three sites were identified as a result of the survey and subsurface testing. Most of the features associated with state site 50–30–08–789, the plantation-era infrastructure, were identified along the coastal portion of the survey area. Included among them were a road, a bunker, terraces, a trail, bridges, a pier, walls, and a ditch. State site 50–30–08–790 consisted of two World War II-era features: a military platform and a foxhole. Sites –789 and –790 were both significant under criterion D for their information content which was sufficiently gathered. No further work was recommended for these sites.

In 1993, a human burial (state site 50–30–08–1899) was identified in the sands of Donkey Beach, north of the the Keālia Beach Transmission Corridor [11]. The remains were identified by a beach goer who noticed a human cranium eroding out of a beach dune deposit. Since beach erosion threatened to compromise the integrity of the remains, it was determined that burial relocation was necessary. The remains were recovered from approximately 0.95 m (meter) below the surface in a 0.65 m thick deposit of calcareous sand and terrestrial sediment. It was determined that the remains were in primary association due to the completeness of the remains. The individual was in a flexed position oriented perpendicular to the beach. No additional cultural materials were recovered as a result of this excavation. Perzinski et al. [14] identified three additional burials in their survey during backhoe trenching in the southern portion of Donkey Beach. All burials were determined to be likely native Hawaiian and were left in place. Site 50–30–08–1899 was recommended for preservation.

In 2005, an archaeological inventory survey identified two previously disturbed human burial sites (sites 50–30–08–3959 and –3960) inland of Kūhiō Highway [6]. Site –3959 consists of a single human molar, and site –3960 consists of the fragmented remains of a human burial likely disturbed during the late 1800s construction of the Makee Sugar Mill.

3 Project Design

On-site archaeological monitoring will be conducted for all trenching activities in Segment D2. These undertaking activities have a potential for adverse effect on significant historic properties. Identified archaeological remains will be recorded and appropriate archaeological samples collected. If cultural materials that indicate the presence of undisturbed deposits are discovered, then archaeological subsurface test excavations may be conducted after consultation with SHPD.

On-call archaeological monitoring is proposed for possible utility pole relocations in Segment D1. There is a relatively low probability that historic properties will be encountered during boring for new utility poles.

3.1 Anticipated Archaeological Remains

Based on the review of land use history and archaeological research at Keālia Ahupuaʻa, the archaeological remains anticipated in the undertaking's APE are isolated subsurface cultural deposits

and human burials in Segment D2. Surface structures are not anticipated because archaeological investigations have confirmed that no traditional Hawaiian surface structures remain in the proposed Keālia Beach Corridor Transmission Line.

3.2 Field Problem

The field problem is defined as a phase of subsurface inventory survey for traditional Hawaiian and historic-era archaeological sites. The primary field problem of the monitoring is identification of paleosols and cultural remains appropriate or suitable for data collection through a program of limited test excavation and sampling. The field problem is explicitly constrained to the APE of the undertaking.

3.3 Research Problems

The problems of archaeological monitoring can be separated into two general categories: site or deposit identification and site or deposit characterization. Site or deposit identification refers to the location of intact cultural deposits, and the estimation of their extent and depth. Site or deposit characterization refers to the determination of the nature and *significance* of the deposits, and their potential to address questions of Hawaiian cultural history and settlement. This set of research problems concerns elements of stratigraphic interpretation, the historical sequence, and the larger problems of Hawaiian archaeology.

As with all exploratory investigations, there is the potential that unexpected historic remains or features will be found. Such remains will be recorded and analyzed with the goal of assessing their relation to either traditional Hawaiian or historic period land use in Keālia.

Although the preceding research problems address positive archaeological concerns, it is clear from previous projects that even well-documented archaeological features often prove elusive in the field. In the event that archaeological remains are not identified in a given area, the collection of stratigraphic data will be directed toward the following problems: (i) determining the extent to which native deposits have been impacted by historic processes in a given area; and (ii) determining the depositional mode of native deposits.

3.4 Fieldwork

Fieldwork will be carried out pursuant to the AMP and in accordance with applicable standards.

3.4.1 Role of the Archaeological Monitor

The archaeological monitor and field crew members will attend a work plan meeting with the engineers involved with the undertaking. At the first of these meetings and subsequent meetings as necessary, the archaeological monitor shall explain the purpose of the archaeological monitoring, the authority of the archaeological monitor to halt construction activities, and the conditions under which such a request would be made. The field procedures and organization will be discussed at these meetings so agreement can be reached on coordination, communication, and scheduling.

3.4.2 Project Personnel

A senior archaeologist will serve as principal investigator for the project. The principal investigator will be responsible for overall project organization and management, will establish and ensure high standards for field sampling and laboratory analyses, may conduct field visits and direct supervision of field personnel as appropriate, and will review content of draft and final monitoring reports. The principal investigator will also be responsible for directing archaeological subsurface test excavations in the event cultural materials indicating the presence of undisturbed deposits are discovered and test excavations are performed.

An archaeological monitor will be present during the ground disturbing activities associated with the *undertaking* as set out in section 3, and will implement the field and laboratory methodologies detailed below. The archaeological monitor will be a BA-level archaeologist, or an archaeologist with equivalent field experience. The archaeological monitor shall have the authority to temporarily halt any undertaking activities in any area where cultural materials have been tentatively identified and are threatened by continuation of the activities. The archaeological monitor will prepare the draft and final monitoring reports.

3.4.3 Field Recording and Sampling

Field recording and sampling will be directed toward the research problems outlined above (see sec. 3.3). They are intended to mitigate any potentially adverse effects to historic properties. Standards of documentation, recording, and analysis of features, soil and sediment profiles, and artifacts shall accord with *Rules Governing Standards for Archaeological Monitoring Studies and Reports*. Accurate map locations of test units, stratigraphic profiles, and archaeological features, deposits, and artifacts shall be maintained.

The first three items in the following list are intended to provide basic stratigraphic data relevant to the reconstruction of land surfaces in the project area in sufficient detail to make possible correlation of land surfaces with information from early topographic maps and with information from past or future archaeological projects. Items four through eleven are intended to address the problem of long-term use of a stable surface and the associated difficulties of inferring use and occupational history.

1. The archaeological monitor or the staff archaeologist will be responsible for recording all stratigraphic profiles with cultural remains or features; stratigraphic profiles where samples have been taken; and profiles where there is a sedimentary change or unconformity that, in the professional judgment of the archaeological monitor or staff archaeologist, contains information important for the research problems itemized above (see pg. 12).
2. The archaeological monitor or staff archaeologist will make notes on exposures whose stratigraphic profiles are not drawn.
3. Locations of all stratigraphic profile drawings and photographs will be recorded, and an elevation above sea level will be established by an appropriate means.
4. All cultural deposits will be examined in the field for
    a) evidence of micro-stratification and other data relevant to evaluation of depositional history, and
    b) evidence of disturbance, irregularity, or boundary conditions that might indicate

cultural activities;

such evidence will be recorded in the profile description.

5. All deposits will be examined for cultural items and the stratigraphic positions of these items will be noted. Notation shall include reference to the age of the artifact and how this age might indicate either disturbance to a deposit of different age, or the age of the deposit.
6. Features will be recorded with attention to stratigraphic positioning, particularly their position of origin.
7. Profile descriptions will include appropriate technical information, in conformance with standards established by the U.S. Soil Conservation Service, as well as field-based interpretation of depositional history.
8. The stratigraphic positions of samples collected from profiles, including artifacts, feature contents, soil samples, and dating materials will be recorded.
9. As needed, sediment and feature content samples may be collected as *total units* without screening for laboratory processing.
10. Samples for dating and environmental analysis shall be collected from the smallest stratigraphic units practicable.
11. Archaeological test excavations, if they occur, will follow the *Rules Governing Standards for Archaeological Monitoring Studies and Reports*. They will be designed to yield information applicable to the research and field problems set out in section 3.

3.5 Burial Treatment Plan

The project area was inhabited and used by native Hawaiians and more recently by diverse ethnic groups primarily associated with ranching and agriculture. Inadvertently discovered human remains might belong to one of several ethnic groups. If human remains are discovered, the archaeological monitor will notify SHPD and all excavation in the vicinity of the find will stop. It is understood that undertaking activities can be performed in other areas. The archaeological monitor will protect any exposed bones in an appropriate fashion, such as covering them with a shallow layer of sediment, and will secure the area.

The archaeological monitor will provide the proper authorities with observed data relevant to the cultural affiliation of the human remains. The observation will be made only on the exposed and/or disturbed deposits and will not involve additional excavation.

The AMP does not propose any additional treatment of human remains, other than documentation of archaeological context.

3.6 Post-Field Actions

The nature and scope of post-field actions will vary depending upon the results of field investigations. At a minimum, if no cultural remains are discovered, a report will be produced to document the negative findings of the field investigations. If cultural remains are discovered, analyses appropriate to the research questions presented in subsection 3 will be carried out and reported.

3.6.1 Laboratory Analyses

Laboratory processing of recovered cultural remains and sediments will meet or exceed *Rules Governing Standards for Archaeological Monitoring Studies and Reports*. Specific analyses will be performed in accordance with the goals of the research design. All data will be recorded on standardized laboratory forms and entered into a project database.

It should be understood that not all samples collected in the course of fieldwork are of equal analytic value. Samples which are determined to have the potential to contribute to the goals of the research design will be sent to specialists for intensive analysis. Materials which are considered to have a low information value will also be reported and described, but may not be analyzed intensively or sent to a specialist.

Generally speaking, artifacts will be photographed, sketched, and identified as appropriate; relevant metric attributes will be measured and recorded. Mathematical manipulations of laboratory data will be carried out for summary descriptions and comparisons with other collections, as appropriate. As appropriate, a *concentration index* will be calculated for each relevant archaeological context related to occupational history and will not be calculated in an interpretive vacuum.

The specific procedures employed in laboratory analysis will vary depending on the type of remains involved. Procedures for the most common types of remains likely to be recovered from Keālia Beach Corridor Transmission Line are described below.

Historic artifacts Historic artifacts will be sorted into sub-classes as appropriate. Examples of sub-classes include bottles and bottle glass, ceramics, nails, other metals, and buttons. Materials which are amenable to in-house analysis will be so treated. Other materials will be sent out for analysis by a qualified specialist. All data will be recorded on standardized laboratory forms.

Lithic artifacts Lithic artifacts will be sorted into the sub-classes of *lithic tools* and *lithic* debitage. Further distinctions will be made between material types (e.g., basalt, volcanic glass, chert). Lithic tools will be photographed, weighed, measured, and assigned to a functional class (e.g., scraper, adze, hammer-stone, etc.). Lithic debitage will be weighed and examined for use-wear. For potentially important debitage assemblages, a normal attribute-based analysis will be performed. All data will be recorded on standardized laboratory forms.

Marine shell Marine shell identified as traditional Hawaiian food remains will be identified to the lowest possible taxonomic level. Each taxon will be weighed in bulk by provenience. Modified shell will be photographed, weighed, measured, and described separately. Shell identified as dating to the historic period will be weighed in bulk by provenience and a representative sample analyzed to establish the range and relative abundance of taxa present. All data will be recorded on standardized laboratory forms.

Non-human bone Non-human bone identified as possible food remains will be identified to the lowest possible taxonomic level. Individual taxa from each provenience will be weighed in bulk. All bone will be examined for intentional modification, processing marks, or other distinguishing features. Bone tools or ornaments will be photographed, weighed, measured, and described separately. All data will be recorded on standardized laboratory forms.

Bulk feature fill Bulk sediment collected from subsurface features will be screened through 0.125 in. mesh screen. A technical sediment description will be recorded for the matrix. Lag captured in the screen will be sorted by material type. Individual material classes will receive the

appropriate specialized analyses described in this section.

Wood charcoal Carbonized plant material submitted for ^{14}C analyses will be identified to the lowest possible taxonomic level and selected to minimize *in-built age*. Wood charcoal identification also provides useful information on the occupational history of a region and on changes to the environment.

3.6.2 Curation

At the completion of the project all cultural materials shall be housed temporarily in the storage facilities of T. S. Dye & Colleagues, Archaeologists. At an appropriate time the materials will be returned to their owners.

3.7 Report Preparation and Scheduling

Preparation of a final technical report shall conform to *Rules Governing Standards for Archaeological Monitoring Studies and Reports*. A draft technical report shall be prepared and submitted in a timely manner, within four months following the end of fieldwork. The revised and corrected final report will be submitted within one month following receipt of review comments on the draft report.

Glossary

boulder Rock fragment 600 mm and greater.

clay Fine earth particles less than 0.002 mm.

coconut The palm, *Cocos nucifera*.

concentration index A measure, such as weight or count, of cultural material per unit excavated sediment.

Contact A period in Hawaiian history marked by the arrival of Captain James Cook in 1778 and characterized by the social changes that eventually brought about the end of traditional Hawai'i.

context A unit of stratification associated with a natural or cultural process or event.

debitage Waste by-products of stone tool manufacture.

detritus Material produced by the disintegration and weathering of rocks that has been moved from its site of origin, or a deposit of such material.

fill Any sediment deposited by any agent so as to fill or partly fill a valley, sink, or other depression.

horizon A subdivision of soil.

in situ In the natural or original position.

in-built age The age of a material when it was incorporated into the archaeological record.

midden A heap or stratum of refuse normally found on the site of an ancient settlement. In Hawai'i, the term generally refers to food remains, whether or not they appear as a heap or stratum.

motif A major theme, or repeatedly used design.

petroglyph A subcategory of *rock art* that includes images created by an extractive process on a rock surface by pecking, engraving or incising, abrading, or bruising.

pre-contact Prior to AD 1778 and the first written records of the Hawaiian Islands made by Captain James Cook and his crew.

project The archaeological investigation, including laboratory analyses and report preparation. See also undertaking.

rock art A term used to include petroglyphs, *pictograph*s, *geoglyph*s, *intaglio*s, *dendroglyph*s, and *geomorph*s. Hawaiian rock art essentially falls into the categories of petroglyphs (primary type of the rock art) or pictographs.

sand Detrital material ranging in size from 0.5 mm to 2 mm in diameter. See also *detritus*.

significance A quality of a historic property that possesses integrity of location, design, setting, materials, workmanship, feeling, and association. The qualities are set out in SHPD administrative rule §13–275–6, *Evaluations of Significance*.

site The fundamental unit of archaeological investigation, a location that exhibits material evidence of past human activity.

sugarcane A grass, *Saccharum officinarum*, widely grown in warm regions as a source of sugar. See also *kō*.

topography The lateral undulation and continuity of the boundary between soil horizons. See also *horizon*.

undertaking Any action with the potential for an adverse effect on significant historic properties. See also *project*.

Hawaiian Terms

ahupua'a Traditional Hawaiian land division, usually extending from the uplands to the sea.

ali'i Chief, chiefess, officer, ruler, monarch, peer, head man, noble, aristocrat, king, queen, commander.

heiau Traditional Hawaiian place of worship.

kō Sugarcane, *Saccharum officinarum*, was introduced to Hawai'i by Polynesian settlers, who cultivated it widely. The stalk was chewed between meals for its sweetness, brought on long journeys to ease hunger, and eaten in times of famine; juice from the stalk was fed to nursing babies, and used as a sweetening agent in medicinal herbal concoctions; the leaves were used as thatching for houses; the leaf midrib was used for plaiting braids that were made into hats; the stem of the flower was used to make darts for a child's game.

kula Plain, field, open country, pasture; land with no water rights.

kuleana Right, title, property, portion, responsibility, jurisdiction, authority, interest, claim, ownership.

lei Garland, wreath.

lo'i A single irrigated taro patch; irrigated terrace, especially for taro.

Māhele The mid-nineteenth century land division responsible for the introduction of fee simple land title in Hawai'i.

makai Seaward.

mauka Inland, upland, toward the mountain.

wahi pana Legendary place.

Abbreviations

AMP A plan for archaeological monitoring written to satisfy the requirements of Hawaii Administrative Rules §13–279–4.

LCA Awards issued by the Board of Commissioners to Quiet Land Titles between 1846 and 1855 to persons who filed claims to land between 1846 and 1848.

m The meter, a base unit of length in the International System of Units, equal to the length of the path traveled by light in vacuum during a time interval of 1/299,792,458 of a second.

SHPD The State Historic Preservation Division of the Hawai'i Department of Land and Natural Resources, a government agency responsible for implementing the National Historic Preservation Act of 1966, as amended, and Chapter 6E of the Hawai'i Revised Statutes.

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APPENDIX B. CHANGES MADE FROM DRAFT EA TO FINAL EA

CHANGES MADE FROM DRAFT TO FINAL EA

Section No.	***Section Title***	***Description***
1.1 and 1.2	*Purpose and Need For Action and Purpose and Need for the Federal Action*	Edited text to clarify purpose and need of USFWS and of KIUC.
1.3	*Public Involvement and Agency Coordination*	Added description of plea agreement between KIUC entered into with U.S. Department of Justice after draft EA was released.
2.1	*No-Action Alternative*	Added information regarding commitments KIUC made under its plea agreement as being part of both the Proposed Action and No-Action Alternative.
2.2.1.4	*Ongoing Operation & Maintenance Activities*	Included description to approximate the increase in line height to maintain a proper offset distance between power lines strung on poles.
		Included a limit of number of pole installations (new, replacement or relocation) that would be covered under the permits.
		Added statement stipulating that if system conditions require non-emergency nighttime work during the autumn fallout season (September 15 through December 15), KIUC's use of lighting would be restricted to between 10:00 PM and 4:00 AM, when very few of the Covered Species are flying between the ocean and inland nesting colonies.
2.2.2.1.1	*New Connections within Existing Service Areas (< 1,320 feet)*	Included a limit on the number of connection pole installations that would be covered under the permits. Also included a limit on the number that could be installed in the darker Northern portion of the island.
		Added statement stipulating that a description of all new connection poles installed will be included in KIUC's Annual Report.
2.2.2.1.5	*Installation of Shielded Street Lights at Government or Private*	Included a limit on the number of new shielded streetlight installations that would be covered under the permits. Also included a limit on the number that could be installed in the darker Northern portion of the island.
		Added statement stipulating KIUC will notify USFWS and DOFAW of all requests and/or applications it receives to install new streetlights within five business days. KIUC will also include information of all new streetlights installed in the Annual Report.
2.2.3.1.1	*Reconfigure Existing Overhead Electrical Power Lines at Selected Locations*	Added statement regarding KIUC's commitment to implement certain power line reconfiguration projects under its plea agreement with DOJ.
		Added information regarding the loss of shielding vegetation for t proposed reconfiguration projects which could increase the risk to the Covered Species. KIUC will use its best efforts to ensure the continued and ongoing presence of such shielding vegetation throu the acquisition of conservation easements or other similar legal instruments from or agreements with the landowners.

Section No.	***Section Title***	***Description***
2.2.3.1.2	*Identify High Risk Streetlights and Implement Additional Feasible Measures*	Added information regarding KIUC's commitment to identify any specific individual KIUC streetlight that appears to have caused the downing of more than one seabird within one fallout season. Upon identifying, KIUC will implement different streetlight technologies or practices.
2.2.3.2.1	*Continue to Use Bird-Friendly Outdoor*	Added information regarding KIUC's commitment to conduct an analysis of the feasibility of using other lighting technologies and practices which might further reduce potential impacts of shielded streetlights on seabirds.
2.2.3.3.2 and 2.2.3.3.3	*Fund Seabird Colony Management and Predator Control*	Clarified that KIUC would commit to funding the specific colony management tasks as described for Limahuli Valley and Hono O Nā Pali even if the actual costs exceed the estimates provided.
2.2.3.3.7	*Potential Additional Conservation Actions in Years 4 and 5*	Added description of KIUC's commitment to provide funds for radar surveys during Years 4 and 5, which could be reallocated to other projects as necessary.
4.1	*Impacts of the No-Action Alternative*	Added information regarding commitments KIUC made under its plea agreement as being part of both the Proposed Action and No-Action Alternative.
4.2.6.1	*Impacts on Non-Covered Species*	Included analysis of anticipated impacts to non-covered species.
4.2.6.1.1	*Impacts of Future Additional Minor Facilities on Covered Species*	Included additional information on the relative impact of the limited new facilities that would be covered under the proposed ITP.
4.2.6.2.2	*Seabird Colony Management and Predator Control*	Included additional information on the relative impact of the colony management that would be implemented under the proposed ITP.
4.2.6.2	*Impact of Additional Operations on Fauna*	Added information regarding the condition that if system conditions require non-emergency nighttime work during the autumn fallout season (September 15 through December 15), KIUC's use of lighting will be restricted to between 10:00 PM and 4:00 AM, when very few of the Covered Species are flying between the ocean and inland nesting colonies.
4.2.6.3	*Estimated Annual Take of Covered Species by Existing Facilities*	Included additional information on the relative impact of the incidental take that would be covered under the proposed ITP.
4.2.13	*Cumulative Impacts*	Included additional information on the cumulative impacts of the Proposed Action on fauna.
4.4.1	*Proposed Action Compared to No-Action*	Added information regarding commitments KIUC made under its plea agreement as being part of both the Proposed Action and No-Action Alternative.
4.4.2	*Alternative Permit Term Compared to No-Action*	Added information regarding commitments KIUC made under its plea agreement as being part of both the Alternative Permit Term and No-Action Alternatives.