DRAFT

Habitat Conservation Plan for HONUAʻULA (WAILEA 670) KĪHEI, MAUI

PREPARED FOR:

U.S. Fish and Wildlife Service
Hawaiʻi Department of Land and Natural Resources

APPLICANT:

Honuaʻula Partners, LLC
381 Huku Liʻi Place, Suite 202
Kīhei, Maui 96753

PREPARED BY:

SWCA Environmental Consultants
Honolulu Office
Bishop Square: ASB Tower
1001 Bishop Street, Suite 2800
Honolulu, HI. 96813

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1 INTRODUCTION AND PROJECT OVERVIEW

1.1 Executive Summary

Honuaʻula Partners, LLC proposes to construct a master-planned community encompassing diverse residential opportunities, commercial and retail mixed uses, on-site recreational amenities, integrated bicycle and pedestrian networks, parks, and open space. Honuaʻula will also feature an 18-hole homeowner's golf course and related facilities, as well as a Native Plant Preservation Area and other areas dedicated to the preservation of native plants and archaeological features. As discussed herein, Honuaʻula has undergone significant public review and comment over the past twelve years. Significantly, Honuaʻula has been approved for urban development since 1994 and has received all discretionary land use approvals for residential, limited commercial and golf course uses.

Activities will occur on the proposed Property over the life of the project that may result in the incidental take of Blackburn's sphinx moth (*Manduca blackburni*), a listed endangered species and the loss of Blackburn's sphinx moth habitat. Post-construction activities associated with the proposed 18-hole golf course could attract a second endangered species, nēnē (*Branta sandwichensis*), resulting in the potential for incidental take of this species. These two species are hereafter collectively referred to as the "Covered Species." In addition, implementation of avoidance and minimization measures is expected to avoid any negative impacts on five additional endangered species: Hawaiian stilt (*Himantopus mexicanus knudseni*), Hawaiian duck (*Anas wyvilliana*), Hawaiian coot (*Fulica alai*), Hawaiian petrel (*Pterodroma sandwichensis*), Hawaiian Hoary bat (*Lasiurus cinereus semotus*), one threatened species: Newell's shearwater (*Puffinus auricularis newelli*), and one species that is proposed for listing as endangered, ʻāwikiwiki (*Canavalia pubescens*) that are either present at the project site, or could be attracted to the site during or after construction. Although no impact is anticipated and no take is requested for these species, avoidance and minimization measures for these species are included in this Habitat Conservation Plan (HCP).

This HCP seeks to offset the potential impact of the proposed development on the two Covered Species with measures that protect and provide a net benefit to the species island-wide and statewide. The Applicant anticipates a 13-year build-out phase starting at the end of 2012 or early 2013, throughout which this HCP will be in effect. Construction will occur in three phases, with Phase 1 starting at the onset of grading. The HCP will also cover post-construction maintenance, management, and operations of the development and golf course. Therefore the Applicant seeks a 30-year Incidental Take Permit (ITP) in accordance with Section 10(a)(1)(B) of the federal Endangered Species Act (ESA) of 1973, as amended, and an Incidental Take License (ITL) in accordance with Chapter 195-D of Hawaiʻi Revised Statutes. These permits are issued by the U.S. Fish and Wildlife Service (USFWS) and State Department of Land and Natural Resources (DLNR), respectively. This HCP supports the issuance of these permits, and describes how the Applicant will avoid, minimize, mitigate and monitor the incidental take of threatened and endangered species that may occur during construction and operation of the proposed project. The general and species-specific mitigation measures the Applicant is proposing are intended to increase knowledge of the species' biology and distribution, enhance populations, or restore degraded native habitat (Table 1-1). Mitigation measures are required to provide a net benefit to the species as required under state law.

No substantive scientific information regarding the population biology (e.g. distribution and abundance, density, population genetics) of Blackburn's sphinx moth on Maui exists for use in calculating potential take at Honuaʻula. Therefore, in accordance with the Habitat Conservation Plan Handbook (Chapter 3, Sections B.2.b. and C.1), a habitat-based approach to quantify take was employed to design on-site and off-site mitigation measures.

This HCP, when approved, will fulfill the requirements for an Incidental Take Permit (ITP) in accordance with Section 10(a)(1)(B) of the federal Endangered Species Act (ESA) of 1973, as amended, and an Incidental Take License (ITL) in accordance with Chapter 195-D of Hawaiʻi Revised Statutes.

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Table 1-1: Mitigation Summary. These mitigation measures will be provided in addition to general avoidance, minimization, and mitigation measures, and comprise the principal mitigation measures that will be implemented to offset the requested take of two Covered Species.

Blackburn's sphinx moth
A. Native Plant Preservation Area
1. Perpetual onsite conservation easement on 40 acres. **2.** Weed control including manual, chemical, mechanical removal. Tree tobacco will not be removed, unless required by USFWS and DOFAW. **3.** Control of rats. **4.** Enhancement and maintenance of native plant community through propagation and outplanting. **5.** The area will be enclosed by stone wall. Ungulates will be excluded from the entire Property. **6.** Plan includes interpretive trails and informational signs. **7.** The area is designed to conserve native vegetation and BSM habitat, and will also provide protection to cultural sites present on site. Trails will allow access for cultural practitioners.
B. Kanaio Conservation Easement
1. The conveyance of a perpetual easement has been approved by the land owner. The easement will be developed and established, through the coordination with DOFAW, the landowner, and Honuaʻula Partners LLC prior to initiation of Phase 1 construction. **2.** An 8 foot ungulate fence currently exists along the northeastern border of the mitigation parcel. This fence will be extended along the remaining borders of the site. The fence will be maintained in perpetuity using a fund established through sales of Honuaʻula properties. **3.** Ungulates will be removed from the enclosure using professional removal techniques. Combined with the fencing, this action will remove one of the primary threats to the existing Blackburn's sphinx moth habitat at the mitigation site. Ungulate removal will be completed within two years, after which the area will be monitored quarterly for ungulate presence and kept clear of ungulates. **4.** A 10-foot wide green fire break will be established within two years of Phase 1 groundbreaking and it will be maintained along the perimeter of the fence to prevent fires started outside the parcel from entering the mitigation area. This fire break, which will act as a green break, will be maintained at no less than 50% cover of kikuyu grass (*Cenchrus clandestinus*), at a height of no more than 6 inches. This fire break will be established over the course of two years and will be maintained in perpetuity. If any portion of the mitigation site is impacted by fire, restoration will be initiated within six months. If any portion of the mitigation site is burned at any time after initiation of Phase I construction at the Property, intensive restoration will be initiated in the burned area within one month. **5.** A cross fencing plan for adjacent land is being developed in coordination with the landowner, Ulupalakua Ranch. Cross fencing will be designed to facilitate rotating cattle grazing in such a pattern to enhance fire control on grazing lands immediately adjacent to the protected area. Fuel management in the areas below (south) of the restoration site will be adequate to ensure a fire igniting at the road below the site will not spread to the mitigation site's location. **6.** The cover of non-native species will be reduced, within five years of initiation of Phase I construction, to less than 25% cover. Thereafter, cover of non-native species will be maintained at less than 25% in perpetuity. Cover of native tree, shrub, vine, and herb species that were elements of the original forest community will be restored, where necessary within 15 years of initiation of Phase 1 construction and a native dry forest ecosystem will be maintained on the site in perpetuity. **7.** ʻĀwikiwiki is suitable for restoration only at the lower elevation Kanaio mitigation site. The species is a short-lived perennial vine that is easy to propagate but difficult to outplant. Re-establishment of ʻāwikiwiki at the Kanaio mitigation area will be conducted by seed scattering and experimentation with outplanting technologies. Between years 10-15, an annual average of 50 ʻāwikiwiki plants will be present at the Kanaio

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mitigation area, with an annual range between 0 to 500 plants. This population will no longer require outplantings to maintain stable and increasing cover trend, and will be maintained in perpetuity.

C. Auwahi Conservation Easement

1. The conveyance of a perpetual easement has been approved by the land owner. The easement will be developed and established, through the coordination with DOFAW, the landowner, and Honua'ula Partners LLC prior to initiation of Phase 1 construction.
2. An 8 foot fence already exists surrounding the entire 190 acre Auwahi Forest Restoration Project, but ungulate grazing continues in most of the area within the enclosure. As restoration of the site progresses fences will be moved or installed and ungulates will be removed from and kept clear of restoration areas.
3. A 10-foot wide fire break will be established along the perimeter of the fence to prevent fires started outside the parcel from entering the mitigation area. This fire break, which will act as a green break, will be maintained at no less than 50% cover of kikuyu grass (*Cenchrus clandestinus*), at a height of no more than 6 inches This fire break will be established over the course of two years and will be maintained in perpetuity. If any portion of the mitigation site is impacted by fire, restoration will be initiated within six months. If any portion of the mitigation site is burned at any time after initiation of Phase I development at the Property, intensive restoration will be initiated in the burned area within one month.
4. This area is included in the cross fencing plan described in item e in section 7.4.1.1. As it relates to protection of the approximately 190 acre Auwahi Forest Restoration Project, fuel management in the areas below (south) of the restoration site will be adequate to ensure a fire igniting at the road below the site will not spread to the mitigation site's location.
5. Kikuyu grass will be removed using a combination of mechanical and chemical removal techniques. The cover of non-native species will be reduced, within five years of initiation of Phase I construction, to less than 5% cover. Thereafter, cover of non-native species will be maintained at less than 5% in perpetuity.
6. Native tree, shrub, vine, and herb species that were elements of the original forest community will be replanted and maintained. A minimum of 500 aiea plants will be propagated and outplanted to the Kanaio/Auwahi mitigation sites within 10 years of initiation of Phase I construction. In year 15 of the permit and beyond, a minimum of 550 aiea will be maintained within the mitigation site.

D. Endowment

1. Maintenance of the three mitigation areas will be maintained in perpetuity through the establishment of an endowment. The endowment will be managed by a conservation organization, entity, or management board that will be selected prior to issuance of the Permit. Habitat within the conservation easements will be managed under the supervision of Honu'aula Partners LLC during the first 15 years of the Permit term. Thereafter, habitat management will be implemented under the supervision of a conservation organization to be agreed upon and named prior to Permit issuance.
   The endowment funding mitigation for the impacts of Phase 1 construction will be more than 50% funded prior to initiation of Phase 1 construction, and further funding assurances are provided in the form of a property-wide annual assessment, secured by a covenant. Likewise, endowment funding for Phase 2 and 3 construction will be put into place prior to initiation of construction for Phase 2 and 3.

Nēnē

A. Alternative 1

An annual contribution of $5000 will be made for the operating cost of the Hawaii Wildlife Center for five years, in addition to payment of $3000 per bird for the rehabilitation and release of five nēnē.

A. Alternative 2

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Alternatively the proposed mitigation measures may consist of providing funding of $30,000 to DLNR for the propagation and release of a total of eight goslings over a three year period.

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1.2 Applicant

The Property was acquired in 2000 by California-based WCPT/GW Land Associates, LCC, which was later succeeded by Honuaʻula Partners, LLC, a successor-in-interest to WCPT/GW Land Associates, and the current owner of the Property. When acquired the subject property was designated for development as Project District 9 in the Kīhei/Mākena Community Plan, zoned for two 18-hole golf courses and limited support uses, and designated Urban by the State Land Use Commission. The applicant's intention from the beginning of this process has been to develop the property consistent with the provisions provided for within the Kīhei/Mākena Community Plan. The applicant initiated a Change in Zoning (CIZ) application with the County of Maui in the fall of 2000, received a recommendation for approval and transmittal to the Maui County Council (Council) from the Maui Planning Commission (MPC) in October of 2001. The applicant initiated hearings with the Council in January of 2002, received a recommendation for approval with conditions from the Council Land Use Committee in November of 2007 and final Project District zoning approval from the Council in March of 2008. Then Mayor Charmaine Tavares signed the legislation into law on April 8, 2008.

Subsequent to final zoning approval the applicant has initiated compliance with the conditions of approval consistent with the provisions of Project District Zoning Ordinance 19.90A. These actions include initiation of an Environmental Impact Statement (EIS) and Phase II zoning application. The Accepting authority for the EIS is the MPC and Phase II zoning approval will be issued by the MPC. Both of these submittals are presently in process with the MPC.

Contact: Charles Jencks
Honuaʻula Partners, LLC
P.O. Box 220
Kīhei, Hawaiʻi 96753
Telephone: (808) 879-5205
Fax: (808) 879-2557

1.3 Regulatory Context

1.3.1 Federal Endangered Species Act (16 U.S.C. 1531-1544)

Section 9 of the Endangered Species Act (ESA) prohibits the unauthorized "take" of any endangered or threatened species of fish or wildlife listed under the ESA. Under the ESA, the term "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. "Harm" in the definition of "take" in the ESA means 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" in the definition of take in the ESA means 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).

The U.S. Fish and Wildlife Service (USFWS) may permit, under certain terms and conditions, any taking otherwise prohibited by Section 9 of the ESA if such taking is incidental to the carrying out of an otherwise lawful activity. To apply for an ITP, an applicant must develop, fund and implement a USFWS-approved HCP to minimize and mitigate the effects of the incidental take. Such take may be permitted provided the following issuance criteria of ESA Section 10(a)(1)(B) and 50 CFR §17.22(b)(2) and 50 CFR §17.32(b)(2) are met:

- The taking will be incidental;
- The applicant will, to the maximum extent practicable, minimize and mitigate the impacts of such takings;
- The applicant will ensure that adequate funding for the conservation plan and procedures to deal with unforeseen circumstances will be provided;
- The taking will not appreciably reduce the likelihood of the survival and recovery of the species in the wild; and

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- Other necessary or appropriate measures required by the Secretary of the Interior, if any, will be met.

To obtain an ITP, an applicant must prepare a supporting HCP that provides the following information described in ESA Section 10(a)(2)(A) and 50 CFR 17.22(b)(1) and 50 CFR §17.32(b)(1):

- The impact that will likely result from such taking;
- The measures the applicant will undertake to monitor, minimize and mitigate such impacts, the funding that will be available to implement such measures, and the procedures to be used to deal with unforeseen circumstances;
- The alternative actions to such taking the applicant considered and the reasons why such alternatives are not proposed to be utilized; and
- Such other measures that the Director of the USFWS may require as necessary or appropriate for purposes of the plan.

The *Habitat Conservation Planning and Incidental Take Permit Processing Handbook*, published by the USFWS and the National Marine Fisheries Service (NMFS) in November 1996, provides additional policy guidance concerning the preparation and content of HCPs. The USFWS and NMFS published an addendum to the *HCP Handbook* on June 1, 2000 (65 FR 35242) (USFWS and NOAA 2000). This addendum, also known as the Five-Point Policy, provides clarifying guidance for the two agencies in issuing ITPs and for those applying for an ITP under Section 10. The five components addressed in the policy are discussed briefly below:

Biological Goals and Objectives: HCPs must include biological goals (broad guiding principles for the conservation program – the rationale behind the minimization and mitigation strategies), and biological objectives (the measurable targets for achieving the biological goals). These goals and objectives must be based on the best scientific information available and are used to guide conservation strategies for species covered by the plan.

Adaptive Management: The Five-Point Policy encourages the development of adaptive management plans as part of the HCP process under certain circumstances. Adaptive management is an integrated method for addressing biological uncertainty and devising alternative strategies for meeting biological goals and objectives. An adaptive management strategy is essential for HCPs that would otherwise pose a significant risk to the Covered Species due to significant information gaps.

Monitoring: According to the Fife-Point policy, monitoring is a mandatory element of all HCPs. As such, an HCP must provide for monitoring programs to gauge the effectiveness of the plan in meeting the biological goals and objectives, and to verify that the terms and conditions of the plan are being properly implemented.

Permit Duration: Under existing regulations, several factors are used to determine the duration of an ITP, including the duration of the applicant's proposed activities and the expected positive and negative effects on Covered Species associated with the proposed duration. Under the Five-Point Policy, the USFWS will also consider the level of scientific and commercial data underlying the proposed operating conservation program, the length of time necessary to implement and achieve the benefits of the operating conservation program, and the extent to which the program incorporates adaptive management strategies.

Public Participation: Under the Five-Point Policy guidance, the USFWS announced its intent to expand public participation in the HCP process to provide greater opportunity for the public to assess, review and analyze HCPs and associated documentation (e.g., National Environmental Policy Act [NEPA] review). As part of this effort, the USFWS has expanded the public review process for most HCPs from a 30-day comment period to a 60-day period.

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1.3.2 Federal National Environmental Policy Act (42 U.S.C. 4371 et seq.)

Issuance of an ITP is a federal action subject to compliance with the National Environmental Policy Act (NEPA). The purpose of NEPA is to promote agency analysis and public disclosure of the environmental issues surrounding a proposed federal action to reach a decision that reflects NEPA's mandate to strive for balance between human activity and the natural world. The scope of NEPA goes beyond that of the ESA by considering the impact of a federal action on non-wildlife resources, such as water quality, air quality and cultural resources. The USFWS will prepare and provide for public review an Environmental Assessment (EA) to evaluate the potential environmental impacts of issuing an ITP and approving the implementation of the proposed Honuaʻula HCP. The purpose of the EA is to determine if ITP issuance and HCP implementation will significantly affect the quality of the human environment. If the USFWS determines significant impacts are likely to occur, a comprehensive Environmental Impact Statement (EIS) for the proposed action will be prepared and distributed for public review; otherwise, a Finding of No Significant Impact (FONSI) will be issued. The USFWS will not make a decision on ITP issuance until after the NEPA process is complete.

1.3.3 Federal Migratory Bird Treaty Act (16 U.S.C. 703-712)

The nēnē, as well as the four waterbird species addressed in this HCP, are also protected under the Migratory Bird Treaty Act (MBTA) of 1918, as amended (16 USC 703-712). The MBTA prohibits the take of migratory birds. A list of birds protected under MBTA implementing regulations is provided at 50 CFR §10.13. Unless permitted by regulations, under the MBTA 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.

The MBTA provides no process for authorizing incidental take of MBTA-protected birds. However, 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 for the take of the nēnē under the MBTA. Therefore, subject to the terms and conditions to be specified in the ITP, if issued, any such take of nēnē also will not be in violation of the MBTA. However, because the MBTA provides for no incidental take authorization, other MBTA-protected birds that are not protected by the ESA and that may be adversely affected by the proposed project will not be covered by any take authorization.

1.3.4 Federal National Historic Preservation Act (16 U.S.C. 470-470b, 470c-470n)

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). The undertaking is defined as the land-use activity that may proceed once an ITP is issued to an Applicant. 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 undertaking, which is 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. The USFWS, in consultation with the SHPO, must make a reasonable and good-faith effort to identify undiscovered historic properties. The USFWS also determines the extent of any archeological investigations that may be required; the cost of NHPA compliance, however, rests with the Applicant.

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Extensive archaeological and cultural resources surveys and impact studies have been conducted for the project, and Honuaʻula Partners, LLC has consulted with SHPO/SHPD. A cultural preservation plan has been created for the Property, and a final AIS has been submitted for approval by SHPD.

1.3.5 Hawaiʻi Revised Statutes, Chapter 195D

Section 195D-4, Hawaiʻi Revised Statutes (HRS), states that any endangered or threatened species of fish or wildlife recognized by the ESA shall be so deemed by State statute. Like the ESA, the unauthorized "take" of such endangered or threatened species is prohibited [§195D-4(e)]. The definition of "take" in Section 195D-2, HRS, mirrors the ESA definition.

Under §195D-4(g), the Board of Land and Natural Resources (BLNR), after consultation with the State's Endangered Species Recovery Committee (ESRC), may issue a temporary license (subsequently referred to as an "ITL") to allow a take otherwise prohibited if the take is incidental to the carrying out of an otherwise lawful activity. To qualify for an ITL, the following conditions must be met:

- The applicant minimizes and mitigates the impacts of the take to the maximum extent practicable (i.e., implements an HCP);
- The applicant guarantees that adequate funding for the HCP will be provided;
- The applicant posts a bond, provides an irrevocable letter of credit, insurance, or surety bond, or provides other similar financial tools, including depositing a sum of money in the endangered species trust fund created by §195D-31, or provides other means approved by BLNR, adequate to ensure monitoring of the species by the State and to ensure that the applicant takes all actions necessary to minimize and mitigate the impacts of the take;
- The plan increases the likelihood that the species will survive and recover;
- The plan takes into consideration the full range of the species on the island so that cumulative impacts associated with the take can be adequately assessed;
- The activity permitted and facilitated by the license to take a species does not involve the use of submerged lands, mining or blasting;
- The cumulative impact of the activity, which is permitted and facilitated by the license, provides net environmental benefits; and
- The take is not likely to cause the loss of genetic representation of an affected population of any endangered, threatened, proposed or candidate plant species.

Section 195D-4(i) directs the Department of Land and Natural Resources (DLNR) to work cooperatively with federal agencies in concurrently processing HCPs, ITLs and ITPs. Section 195D-21 deals specifically with HCPs and its provisions are similar to those in federal regulations. HCPs submitted in support of an ITL application must:

- Identify the geographic area encompassed by the plan; the ecosystems, natural communities, or habitat types within the plan area that are the focus of the plan; and the endangered, threatened, proposed and candidate species known or reasonably expected to be present in those ecosystems, natural communities or habitat types in the plan area;
- Describe the activities contemplated to be undertaken within the plan area with sufficient detail to allow DLNR to evaluate the impact of the activities on the particular ecosystems, natural communities or habitat types within the plan area that are the focus of the plan;
- Identify the steps that will be taken to minimize and mitigate all negative impacts, including without limitation the impact of any authorized incidental take, with consideration of the full range of the species on the island so that cumulative impacts associated with the take can be adequately assessed; and the funding that will be available to implement those steps;
- Identify the measures or actions to be undertaken; a schedule for implementation of the measures or actions; and an adequate funding source to ensure that the actions or measures are undertaken in accordance with the schedule;
- Be consistent with the goals and objectives of any approved recovery plan for any endangered species or threatened species known or reasonably expected to occur in the ecosystems, natural communities or habitat types in the plan area;

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- Provide reasonable certainty that the ecosystems, natural communities or habitat types will be maintained in the plan area throughout the life of the plan;
- Contain objective, measurable goals; time frames within which the goals are to be achieved; provisions for monitoring; and provisions for evaluating progress in achieving the goals quantitatively and qualitatively; and
- Provide for an adaptive management strategy that specifies the actions to be taken periodically if the plan is not achieving its goals.

Section 195D-25 provides for the creation of the ESRC, which is composed of biological experts, representatives of relevant federal and state agencies (i.e., USFWS, U.S. Geological Survey [USGS], DLNR), and appropriate governmental and non-governmental members to serve as a consultant to the DLNR and the BLNR on matters relating to endangered, threatened, proposed and candidate species.

Duties of the ESRC include reviewing all applications for HCPs, Safe Harbor Agreements, and ITLs, and making recommendations to the DLNR and the BLNR on whether they should be approved, amended or rejected; reviewing all existing HCPs, Safe Harbor Agreements and ITLs annually to ensure compliance, and making recommendations for any necessary changes; and considering and recommending appropriate incentives to encourage landowners to voluntarily engage in efforts that restore and conserve endangered, threatened, proposed, and candidate species. Hence, the ESRC plays a significant role in the HCP planning process. The Applicant provided a pre-HCP introductory presentation to the ESRC on December 6th, 2010.

1.3.6 Hawaiʻi Revised Statutes, Chapter 343

Chapter 343, Hawaiʻi Revised Statutes (Environmental Impact Statements) was developed to establish a system of environmental review which will ensure that environmental concerns are given appropriate consideration in decision making along with economic and technical considerations (§343-1, HRS).

A State Environmental Impact Statement (EIS) was prepared for Honuaʻula (PBR Hawaiʻi 2010, 2012), because the project involves:

- Extension of Piʻilani Highway from Wailea Ike Drive to Kaukahi Street, a portion of which will be on right-of-way (ROW) owned by the State of Hawaiʻi, and;
- Possible development of an on-site wastewater treatment facility.

The Maui County Planning Department submitted the EISPN to the State of Hawaiʻi Office of Environmental Quality Control (OEQC) on February 23, 2009. Notice of the availability of the EISPN was published in the March 8, 2009 edition of the OEQC's *The Environmental Notice*. The public comment period for the EISPN began March 8, 2009 and ended April, 7, 2009.

The Maui County Planning Department subsequently submitted an EA/EISPN to OEQC on September 18, 2009. Notice of the availability of the EA/EISPN was published in the October 8, 2009 edition of the OEQC's *The Environmental Notice*. The official public comment period on the EA/EISPN was from October 8, 2009 to November 7, 2009; however, Honuaʻula Partners, LLC voluntarily extended the comment period until November 17, 2009 to allow all consulted parties ample time to provide comments.

Subsequent to the EA/EISPN public comment period, Maui County Planning Department submitted the Draft EIS to OEQC on April 13, 2010. Notice of the availability of the Draft EIS was published in the April 23, 2010 edition of OEQC's *The Environmental Notice*. The official 45-day public comment period on the Draft EIS was from April 23, 2010 to June 7, 2010; however as a courtesy to those that requested more time to review the Draft EIS, Honuaʻula Partners, LLC again voluntarily extended the comment period on the Draft EIS until June 30, 2010. The Maui County Planning Department approved the FEIS on July 24, 2012 (PBR Hawaiʻi 2012).

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1.4 Project Description

1.4.1 Project History

The first Environmental Impact Statement (EIS) approved for development of this site was published by PBR Hawaiʻi in 1988. In 1992, the Community Plan Amendment and FEIS were approved as Project District 9 in the Kīhei-Mākena Community Plan and Chapter 19.90A, Maui County Code ("MCC"). In 1993, Project district zoning approval was received for the entire 670 acre Property. In 1994, the State Land Use Commission issued its Decision and Order approving Urban Designation for the Property. Following project redesign, the Maui County Council approved Bills 21 and 22 in December 2007 providing for Conditional Project district zoning for all 670 acres allowing for residential, limited commercial, golf course and open space zoning.

1.4.2 Project Design and Components

Honuaʻula will be a master-planned community encompassing diverse residential opportunities, commercial and retail mixed uses, on-site recreational amenities, integrated bicycle and pedestrian networks, parks, and open space. Honuaʻula will also feature an 18-hole homeowner's golf course and related facilities, as well as a Native Plant Preservation Area and other areas dedicated to the preservation of native plants and archaeological features. As discussed herein, Honuaʻula has been planned and undergone significant public review and comment for over twelve years. More significantly, Honuaʻula has been approved for urban development since 1994 and has received all discretionary land use approvals for residential, limited commercial and golf course uses.

Honuaʻula will provide homes priced for a range of consumer groups, including workforce affordable homes in compliance with Chapter 2.96, MCC (Residential Workforce Housing Policy). It will reflect community values and feature distinctive architecture to create a unique and compelling community in context with the Kīhei-Mākena region. This cohesive approach will integrate natural and human-made boundaries and landmarks to craft a sense of place within a defined community. In addition, a principal design and planning goal is to preserve defining features of Honuaʻula, such as the topography and views, as much as possible.

1.4.3 Covered Activities

This HCP, and associated Federal and State incidental take authorizations to be issued by the USFWS and DLNR will cover and provide authorization for incidental take resulting from the following activities, which will occur as part of the project. These are subject to any requirements or restrictions described in this HCP or the incidental take authorization documents:

- Grading and earth-moving
- Installation and construction of infrastructure
- Construction of homes and facilities
- Installation of landscaping
- Driving and biking on the Property by employees, contractors, and public on established roadways, sidewalks, and paths in accordance with posted speed limits
- Operation, maintenance, and management of all constructed facilities
- Operation, maintenance, and management of the golf course
- General property operation, management of maintenance facilities, including landscape maintenance
- Implementation of the conservation measures outlined in this HCP

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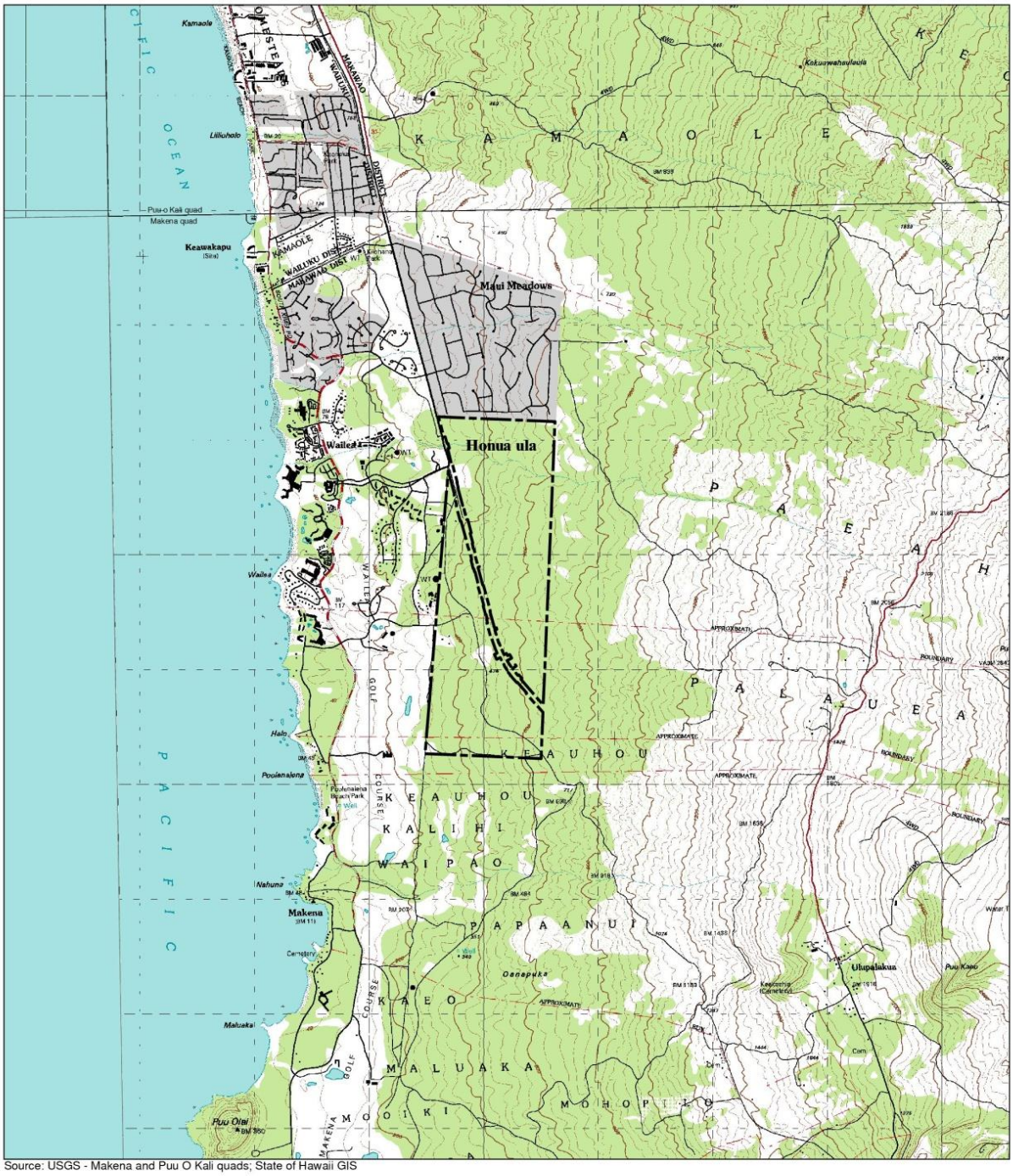
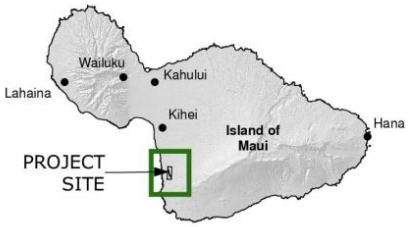
Figure 1.1: Project Location

SWCA Inc. Honua'ula



Source: USGS - Makena and Puu O Kali quads; State of Hawaii GIS



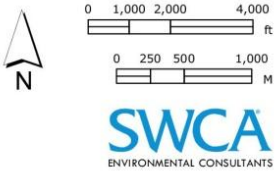


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Figure 1.2: Conceptual Project Layout

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1.4.4 Purpose and Need for Honuaʻula Project

The purpose and intent of Honuaʻula is to implement the Project District 9 ordinance (Chapter 19.90A, MCC) governing the Property, which establishes permissible land uses and appropriate standards of development for a residential community consisting of single-family and multi-family dwellings complemented with village mixed uses, all integrated with an 18-hole homeowner's golf course and other recreational amenities. As planned, Honuaʻula is consistent with the residential, commercial, and recreational uses in the Kīhei-Mākena Community Plan, which has been affirmed through a community-based process. Consistent with the Kīhei-Mākena Community Plan and Chapter 19.90A, MCC, Honuaʻula will:

- Provide a mix of single- and multi-family housing types for a range of consumer groups;
- Emphasize community development with single- and multi-family units complemented with village mixed uses and commercial uses primarily serving the residents of the community;
- Integrate a golf course and other recreational amenities with the different uses within Honuaʻula;
- Integrate community-oriented parks with pedestrian and bicycle recreation ways;
- Incorporate buffer zones between residential areas and the Piʻilani Highway extension corridor; and
- Provide a site for future public use in anticipation of need (PBR Hawaiʻi 2010).

The need for Honuaʻula stems from a substantial unmet demand for housing, including workforce housing, in the Kīhei-Mākena region over the coming two decades. It is projected that demand for new residential units in the Kīhei-Mākena region will range from 7,000 to over 10,000 units over the next 22 years. Excluding Honuaʻula, a total of approximately 5,160 units are either currently unsold or planned in the region, resulting in a projected regional shortfall of 1,840 to 5,686 units. Therefore, Honuaʻula, with its housing units priced for a range of consumer groups, will serve to satisfy the unmet demand for housing in the Kīhei-Mākena region (Hallstrom 2009).

Honuaʻula is also needed for the significant economic benefits it will provide. Honuaʻula is expected to infuse more than one billion dollars in capital investment into the Maui economy and create thousands of jobs during the projected 13-year construction and build-out period. After construction, Honuaʻula will provide hundreds of permanent jobs and contribute over one and a half million dollars in annual property tax revenue to the County of Maui. Positive economic contributions by the creation of Honua'ula will include approximately:

- $1.2 billion of direct capital investment in the Maui economy during the build-out period;
- 9,537 "worker years" of direct on-site employment during the build-out period;
- $480 million in employee wages paid out during the build-out period;
- 518 jobs (382 directly related to on-site activities and 136 related to indirect off-site activities) after the build-out period;
- $19 million in annual wages from the on and off-site jobs after the build-out period;
- $513.9 million (nearly $40 million annually) in discretionary expenditures into the Maui economy by Honuaʻula residents and guests during the build-out period;
- $77 million annually in discretionary expenditures into the Maui economy by Honuaʻula residents and guests after the build-out period;
- $41.8 million in net tax revenue benefit (taxes less costs) to the County of Maui during the build-out period;
- $1.6 million in annual net tax revenue benefit (taxes less costs) to the County of Maui after the build-out period;
- $97 million in net tax revenue benefit (taxes less costs) to the State of Hawaiʻi during the build-out period; and
- $1.5 million in annual net tax revenue benefit (taxes less costs) to the State of Hawaiʻi after the build-out period.

Furthermore, if developed, Honuaʻula will contribute significantly to the provision of public services by providing $5 million to the County for the development of the South Maui Community Park, $3.45 million to the Department of Education, two acres of land to the creation of a fire station, and $550,000 to the County for the development of a police station.

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1.5 List of Preparers

Jason Balmut, B.A., Senior GIS Analyst, SWCA Environmental Consultants
Jaap Eijzenga, M.S., Wildlife Ecologist, SWCA Environmental Consultants
James Feldman, M.S. AICP, Environmental Planner, SWCA Environmental Consultants
John Ford, M.S., Pacific Office Principal, SWCA Environmental Consultants
Ling Ong, Ph.D., Fish and Wildlife Biologist, SWCA Environmental Consultants
Teifion Rice-Evans, M.A., Managing Principal, Economic & Planning Systems (EPS).

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2 DESCRIPTION OF HABITAT CONSERVATION PLAN

2.1 Purpose of This HCP

Activities will occur on the proposed Property over the life of the project that may result in the incidental take of Blackburn's sphinx moth (*Manduca blackburni*) and the loss of Blackburn's sphinx moth habitat. Post-construction activities associated with the proposed 18-hole golf course could attract a second endangered species, nēnē (*Branta sandwichensis*) resulting in potential for incidental take of this species. In addition, implementation of avoidance and minimization measures is expected to avoid any negative impacts on five additional endangered species: Hawaiian stilt (*Himantopus mexicanus knudseni*), Hawaiian duck (*Anas wyvilliana*), Hawaiian coot (*Fulica alai*), Hawaiian petrel (*Pterodroma sandwichensis*), Hawaiian Hoary bat (*Lasiurus cinereus semotus*), one threatened species: Newell's shearwater (*Puffinus auricularis newelli*), and one species currently proposed for listing as endangered, ʻāwikiwiki (*Canavalia pubescens*) that are either present at the project site, or could be attracted to the site during or after construction. Although no impact is anticipated and no take is requested for these species, avoidance and minimization measures for these species are included in this HCP.

These species are protected under the ESA, as amended. Because of the documented presence of these species at or near the proposed facility and the anticipated take in connection with construction and operation of the proposed project, the Applicant has filed an application for an ITP in accordance with Section 10(a)(1)(B) of the ESA and an ITL pursuant to HRS Chapter 195-D. This HCP has been prepared to fulfill application requirements for these permits. Upon issuance of the ITL, the Applicant will be authorized for the clearing of Blackburn's sphinx moth habitat in connection with the otherwise lawful construction and operation of the proposed project.

The purpose of this HCP is to address the following:

1. To make the most supportable determinations as to the potential impact that the development could have on the listed species;
2. To discuss alternatives to the proposed development and its design, in terms of these impacts;
3. To propose appropriate efforts to minimize, mitigate, and monitor these potential impacts to the maximum extent practicable;
4. To ensure funding for the completion of these efforts; and
5. To provide for adaptive management and adjustment of the above measures as determined during implementation of the HCP.

2.2 Scope and Term

This HCP seeks to offset the potential impact of the proposed development on the Covered Species with measures that protect and provide a net benefit to the species island wide and statewide. The Applicant anticipates a 13-year build-out starting at the end of 2012, or early 2013 throughout which this HCP will be in effect. The HCP will also cover post-construction maintenance, management, and operations of the development and golf course. Therefore, the Applicant seeks a 30-year ITP and ITL. The ITP and ITL will be issued to take effect at the initiation of Phase I construction, during and after which anticipated impacts are expected.

No substantive scientific information regarding the population biology (e.g. distribution and abundance, density, population genetics) of Blackburn's sphinx moth on Maui exists for use in calculating potential take at Honuaʻula. Therefore, in accordance with the Habitat Conservation Plan Handbook (Chapter 3, Sections B.2.b. and C.1), a habitat-based approach to quantify take will be employed to design on-site and off-site mitigation measures.

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2.3 Surveys and Resources

The following sources were utilized in the preparation of this HCP. Many of these documents cite additional relevant studies:

- EIS and appendices for Wailea 670 (PBR Hawaiʻi 1988)
- DEIS and appendices for Honuaʻula (PBR Hawaiʻi 2010)
- FEIS and appendices for Honuaʻula (PBR Hawaiʻi 2012)
- Ground Water Resources Assessments
- Marine Water Quality Assessment
- Marine Environmental Assessments
- Golf Course Best Management Practices
- Botanical Surveys of Honuaʻula (SWCA 2009a)
- Botanical Survey of Alternate Sewer Line Alignments to the Mākena WWTF (SWCA 2009c)
- Botanical Survey of Alternate Water Line Alignments to Honuaʻula (SWCA 2010b)
- Wildlife Surveys of Honuaʻula (referenced in SWCA 2009b);
- Wildlife Survey of Alternate Sewer Line Alignments to the Mākena WWTF (SWCA 2009d)
- Wildlife Survey of Alternate Water Line Alignments to Honuaʻula (SWCA 2010b)
- Conservation & Stewardship Plan and Animal Management Plan for Honuaʻula (SWCA 2010a)
- Archaeological Inventory Surveys
- Cultural Impact Assessments
- Cultural Resources Preservation Plan
- Archaeological Preservation and Mitigation Plan

Table 2-1: Federal and/or State listed species addressed within this HCP.

Scientific Name	Common, Hawaiian Name(s)	Date Listed	Status[1]
Take Requested			
Manduca blackburni	Blackburn's sphinx moth	02/01/2000	E
Branta sandwichensis	Hawaiian goose, nēnē	03/11/1967	E
No Take Requested			
Pterodroma sandwichensis	Hawaiian petrel	03/11/1967	E
Puffinus auricularis newelli	Newell's shearwater, ʻaʻo	10/28/1975	T
Anas wyvilliana	Hawaiian duck, koloa maoli	03/11/1967	E
Himantopus mexicanus knudseni	Hawaiian stilt, aeʻo	10/13/1970	E
Fulica americana alai	Hawaiian coot, ʻala keʻokeʻo	10/13/1970	E
Asio flammeus sandwichensis[2]	Hawaiian short-eared owl, pueo	--	--
Lasiurus cinereus semotus	Hawaiian hoary bat, ʻopeʻapeʻa	10/13/1970	E
Canavalia pubescens	ʻāwikiwiki	--	P[3]
1) E = Federally endangered; T = Federally threatened; P = Proposed for listing (Federal)			

[2] The Hawaiian short-eared owl is not a federally listed as an endangered species. Only Oʻahu Island populations of the short-eared owl are listed as endangered by the State of Hawaiʻi.
[3] *Canavalia pubescence* was proposed for listing as endangered on June 11, 2012.

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3 ENVIRONMENTAL SETTING

3.1 Location, Vicinity, & Climate

Honuaʻula encompasses a rectangular area of 270 ha (670 ac) on the southeastern slope of Mt. Haleakalā, Paeahu Ahupuaʻa, Maui, between 295-804 feet (90-245 m) elevation (Figure 1.1). Local climatic conditions at the site are characteristic for the dry, sunny, and warm, leeward Kīhei-Mākena coast. Average monthly temperatures in the region range from 71.7^{o}F (January) to 78.5^{o}F (August) (Western Regional Climate Center 2005). The area is arid, with mean annual precipitation ranging from 406 to 508 mm (16 to 20 inches) throughout the region (Maui County Data Book 2008). Northeast trade winds prevail approximately 80 to 85 percent of the time averaging 10 to 15 miles per hour (mph) during the afternoons, with slightly lighter winds in the mornings and nights. Southerly Kona winds occur most commonly between October and April (Maui County Databook 2008).

3.2 Topography and Geology

Approximately 200 ha (495 ac) of land in the northern three-quarters of the Honuaʻula Property is underlain by older lava flows of the Kula Volcanic Series (ranging from 13,000 to 950,000 years old). Weathering of lavas led to the formation of a thin layer of soil over the northern portion. About 70 ha (170 ac) of younger lava of the Hana Volcanic Series (between 5,000 and 13,000 years old) makes up the southern quarter of the Property. The southern lava flows have not undergone extensive weathering. This southern area is characterized by an extremely rough surface composed of broken ʻaʻā lava blocks called clinker with little or no soil accumulation (PBR Hawaiʻi 1988). The soils and lavas covering the Property, and the drainage gulches that run across the land, strongly influence the nature of the vegetation that grows there. Altenberg (2010) describes it as follows: "ʻAʻā habitat consists of microsites of soil scattered among clinker lava".

3.3 Soils

The USDA-SCS Natural Resources Conservation Service, Soil Survey of the Islands of Kauaʻi, Oʻahu, Maui, Molokaʻi, and Lanaiʻi classifies the soils at the Property area into four soil types of two soil associations: Keawakapu-Mākena association and Kamaʻole-Oanapuka association. The USDA-SCS designates the four on-site soil types as: 1) Oanapuka, very stony loam (OAD); 2) Very Stony Land (rVS); 3) Mākena Loam, stony complex (MXC); and 4) Keawakapu, extremely stony silty clay loam (KNXD). Mākena Loam, stony complex, 3 to 15 percent slopes (MXC) occurs on the lower leeward slopes of Haleakalā, between Mākena and Kamaʻole. It consists of Mākena Loam and Stony Land. Stony Land occurs on low ridges and makes up 30 to 60 percent of the complex. Mākena Loam occurs as gently sloping areas between the low ridges of Stony Land.

On the Mākena part of the complex, permeability is moderately slow, runoff is slow to medium, and the erosion hazard is slight to moderate. The available water capacity is about 1.8 inches per foot of soil. On the Stony Land part, permeability is very rapid and there is no erosion hazard. Mākena part is in capability classification VIs, non-irrigated; stony land part is in capability classification VIIs, non-irrigated. Keawakapu, extremely stony silty clay loam (KNXD) occurs on low uplands. This soil series consists of well-drained, extremely stony soils. These soils developed in volcanic ash. Permeability is moderate. Runoff is slow to medium, and the erosion hazard is slight to moderate. Capability classification is VIs, non-irrigated. Oanapuka very stony silt loam, 7 to 25 percent slopes (OAD) occurs on the lower uplands. This soil series consists of well-drained, very stony soils. These soils developed in volcanic ash and material derived from cinders. Permeability is moderately rapid. Runoff is slow, and the erosion hazard is slight to moderate. Capability classification is VIs, non-irrigated. Very Stony Land (rVS) consists of young ʻaʻā lava that has a thin covering of volcanic ash that locally extends deep into cracks and depressions. The slope ranges from 7 to 30 percent and occurs in very steep gulches. Soils within the property are illustrated in Figure 3.1.

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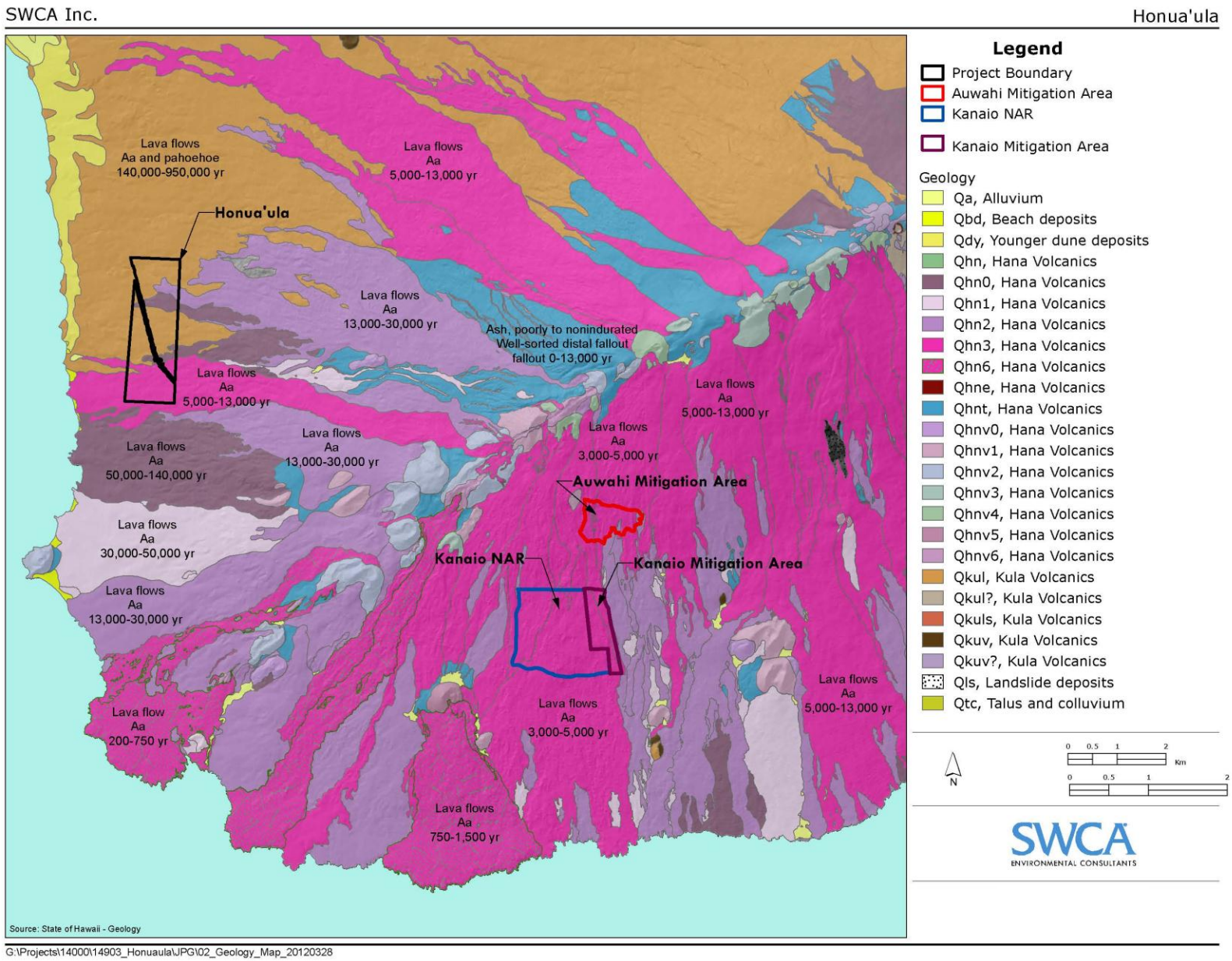
Figure 3.1 Soil types within the Project boundary



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3.4 Hydrology, Drainage and Water Resources

3.4.1 Surface Water

Hydrological processes in Hawaiʻi are highly dependent on the climatic and geological features, and stream flow is influenced by rainfall and wind patterns. The semi-arid area in which the Property is located receives on average an annual rainfall of 18 inches. Because of the relatively dry conditions at and above the area, gulches traversing the Property fill with runoff only during, and briefly following, heavy rainfall events. No perennial streams exist within the project area.

3.4.2 Flooding

The Flood Insurance Rate Map (FIRM) prepared by the Federal Emergency Management Agency's National Flood Insurance Program depicts flood hazard zones throughout the state, and classify lands into four zones depending on the expectation of flood inundation. The majority of the project area is located in flood zone C, which is outside of the 500-year flood plan in an area of minimal flooding.

3.4.3 Groundwater

The project area and the wells that will supply the Project are located within the Kamaʻole Aquifer System, an area delineated and regulated by the State Commission on Water Resource Management (CWRM). This system comprises a wedge-shaped area of approximately 89 square miles with its base along an 11-mile stretch of shoreline from Waiakoa Gulch on the north to Cape Kinaʻu on the south, and its apex at the top of Haleakalā. Based on drilled wells and by geophysical soundings, groundwater in the Kamaʻole Aquifer exists as a basal lens from the shoreline as far inland as the 1,700-foot contour (Tom Nance Water Resources Engineers 2010).

3.5 Environmental Contaminants

A phase I Environmental Site Assessment was conducted for Honuaʻula by LandAmerica Assessment Corporation (2007). This assessment included a site reconnaissance as well as research and interviews with representatives of the public, property ownership, site manager, and regulatory agencies. The Environmental Site Assessment did not reveal any evidence of recognized environmental conditions in connection with the Property, nor did it find any upgradient sites of potential concern to the Property based on review of a database report from Environmental Data Resources for the Property and surrounding areas (LandAmerica, 2007).

3.6 Land Use Designations

Under The State Land Use Law (Act 187), Hawaiʻi Revised Statutes Chapter 205, all lands and waters in the state are classified into one of four districts: Agriculture, Rural, Conservation and Urban. In addition, land use is dictated by the Land Use Ordinance from the City and County.

The State Land Use is classified as Urban; the Property falls within the County and Community Plan Zoning Project District 9, and does not fall within the Special Management Area.

3.7 Vegetation Within the Property

Botanical surveys in context of the proposed activities were conducted by SWCA in March 2008 and in May 2009 (SWCA 2009a). Several preceding surveys have been conducted at the Property since 1988 (Char and Linney 1988; Char 1993, 2004; SWCA 2006; Altenberg 2007). Char and Linney (1988) recorded 132 plant species, including 21 native species, and identified one species proposed for listing as endangered: ʻāwikiwiki (*Canavalia pubescens*). They recommended protection of a small area in the south-western corner of the Property where they found ʻāwikiwiki and other uncommon native plants, but unknown persons subsequently bulldozed the area and all of these plants were lost. SWCA recorded 146 plant species within the boundaries of the Property, 26 of which are native, 14 of these endemic. The remaining 120 plant species are introduced non-native species.

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Altenberg (2007) found 20 native plants, including 12 endemic species, and identified four native species not previously recorded by Char and Linney (1988) or Char (1993, 2004): pua kala (*Argemone glauca*), alena (*Boerhavia repens*), akoko (*Euphorbia celastroides var. lorifolia*), and anunu (*Sycios pachycarpus*). However, Char and Linney (1988) and Char (1993, 2004) reported five species not found later by Altenberg (2007): maidenhair fern (*Adiantum capillus-veneris*), *pellaea* (*Pellaea ternifolia*), *kakonakona* (*Panicumtorridum*), *Solanum americanum* (*popolo*) and alena (*Boerhavia repens*). Altenberg (2007) suggested that Honuaʻula contains much of the third-largest contiguous area of wiliwili (*Erythrina sandwichensis*) habitat on Maui and recommended the southwestern 110 acres be protected for its ecological value. Price et al. (2007) assigned values of 'medium' to 'low' habitat quality for wiliwili within the area encompassing the Property on his habitat quality maps, based on bioclimatic data. A number of areas in southeastern Maui located between Puʻu Olai and Kaupo outside the Property did appear on these maps as having 'high' habitat quality for wiliwili (Price et al. 2007).

Char and Linney (1988) divided the vegetation on the Property into three distinct vegetation types: kiawe (*Prosopis pallida*)/buffelgrass (*Cenchrus ciliaris*) pasturelands, gully vegetation, and scrub vegetation. More recent US Geological Service GAP Analysis Program (Figure 3.2) classified land cover within the Property largely as "XT: open kiawe forest and shrubland (alien grasses)", "Y: uncharacterized open-sparse vegetation", with small patches of "XG: alien grassland" and "XT: alien forest". SWCA (2009a) described three distinct vegetation types within the Property: kiawe-buffelgrass grassland, kiawe-wiliwili shrubland, and gulch vegetation, similar to the three categories described by Char and Linney (1988).

About 75% of the northern portion of the project parcel is characterized by an extensive grassland comprised primarily of kiawe (*Prosopis pallida*) and buffelgrass (*Cenchrus ciliaris*). Guinea grass (*Urochloa maxima*), natal redtop (*Rhynchelytrum repens*), and sour grass (*Digitaria insularis*) were also scattered throughout the northern portion of the Property. Other plants found in this area include mostly invasive aliens, most notably koa haole (*Leucaena leucocephala*), lantana (*Lantana camara*), partridge pea (*Chamaecrista nictitans*) and cow pea (*Macroptilium lathyroides*). The area has been disturbed throughout by numerous jeep trails and unrestricted grazing by axis deer. Some open areas that appeared to be heavily grazed were devoid of buffelgrass but contained the native shrubs ʻilima (*Sida fallax*) and hoary abutilon (*Abutilon incanum*), and the introduced golden crown beard (*Verbesina encelioides*). The vast expanse of kiawe-buffelgrass in the northern three quarters of the Property is bisected from east to west by several gulches that carry flood waters to the sea during and briefly after heavy rainfall events. These intermittent gulches vary in depth and are shaded by their steep walls providing relatively cool and moist conditions, resulting in a unique vegetation type. Three species of ferns including maidenhair fern (*Adiantum capillus-veneris*), sword fern (*Nephrolepis multiflora*), and the endemic ʻiwaʻiwa fern (*Doryopteris decipiens*) were found in the shaded rocky outcrops and crevices within the gulches.

Native pili grass (*Heteropogon contortus*) was found in more open and sunny locations around the gulches. Other species found within the gulches include tree tobacco (*Nicotiana glauca*), wiliwili lantana, partridge pea, golden crown-beard (*Verbesina encelioides*), ʻilima (*Sida fallax*), hoary abutilon (*Abutilon incanum*), koa haole (*Leucaena leucocephala*), indigo (*Indigofera suffruticosa*), ʻuhaloa (*Waltheria indica*) and lion's ear (*Leonotis nepetifolia*). Remnant mixed kiawe-wiliwili shrubland was limited to the southern ʻaʻā lava flow in the southern quarter of Property (Figure 6.1). Scattered groves of wiliwili and kiawe trees co-dominated the upper story. Native shrubs, such as ʻilima and maiapilo (*Capparis sandwichiana*), and the native vine ʻānunu (*Sicyos pachycarpus*), were represented in the understory. Ground vegetation in these and all areas was dominated by introduced shrubs, introduced grasses, and introduced vines and herbaceous species. Lantana (*Lantana camara*), found throughout the mixed kiawe-wiliwili shrubland, showed signs of dieback. Guinea grass (*Urochloa maxima*) found on the site, although abundant, was grazed to stubble, probably by axis deer. SWCA conducted a thorough, quantitative assessment of the vegetation on the Property, including spatially explicit information on native species and their distribution. A detailed report of the analysis and findings can be found in Appendix 1. Table 3-1 below lists native plant species recorded on the Property by SWCA (2009a). In addition, surveys were done by SWCA for off-site areas impacted by creation and/or improvements of waterlines, but no significant findings were reported in terms of sensitive or listed native species (SWCA 2009c, 2010b). The proposed offsite areas were surveyed by Xamanek Researches (1994) and no sensitive or native species were documented.

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Figure 3.2: Hawai'i GAP Land Cover

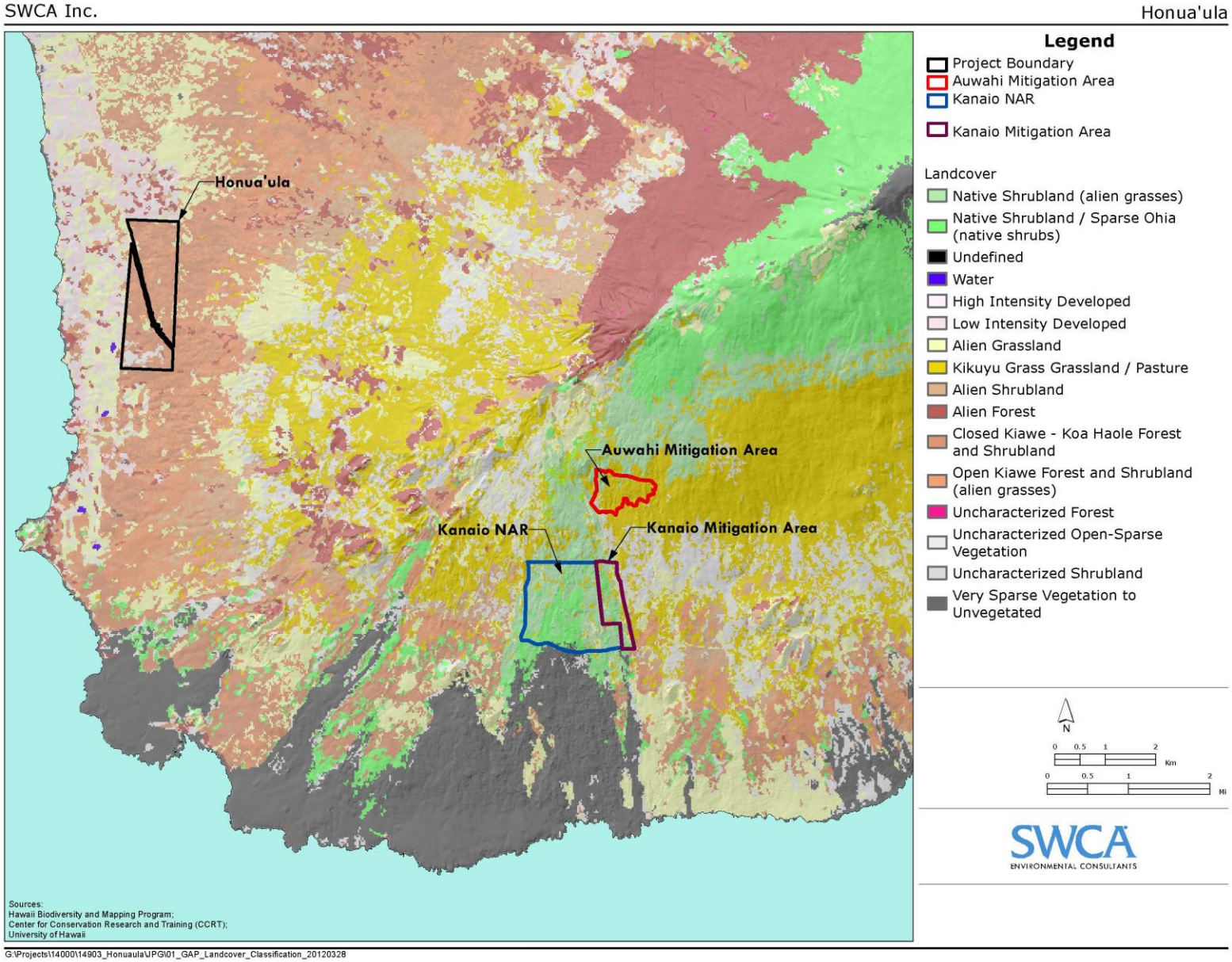

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Figure 3.4: Native Plant Count Classes

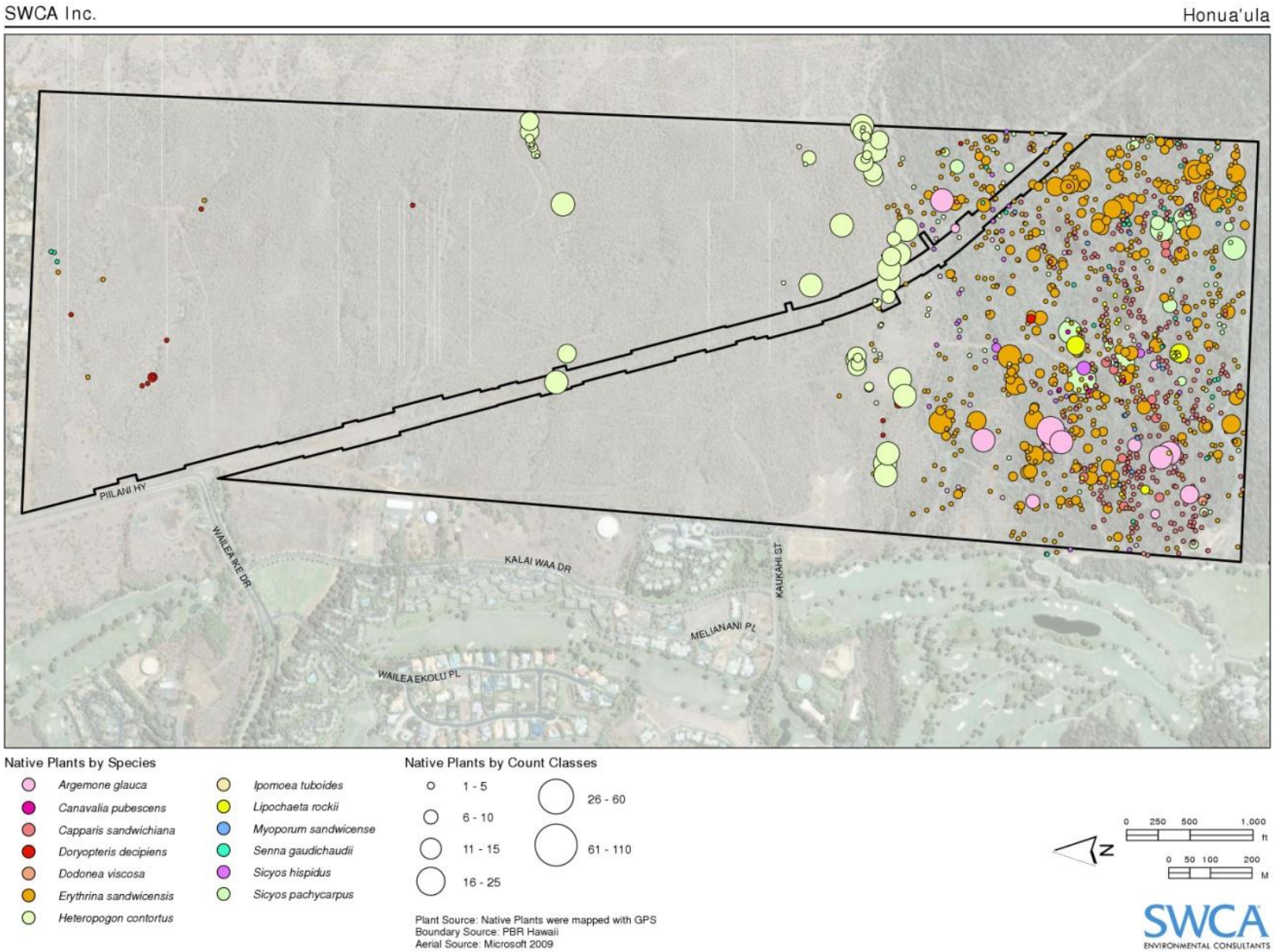

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Table 3-1 Native plants reported from the project area arranged in order of their relative importance. Source: SWCA (2009a).

Species	Status	Hawaiian or Common Name	Family
GROUP 1			
Lipochaeta rockii	E	nehe	Asteraceae
Canavalia pubescens	E	ʻāwikiwiki	Fabaceae
Erythrina sandwicensis	E	wiliwili	Fabaceae
Capparis sandwichiana	E	maiapilo	Capparaceae
Senna gaudichaudii	I	kolomona	Leguminoceae
Sicyos hispidus	E	ʻānunu	Cucurbitaceae
Sicyos pachycarpus	E	ʻānunu	Cucurbitaceae
Euphorbia celastroides var. *lorifolia**	E	ʻakoko	Euphorbiaceae
Argemone glauca	E	pua kala	Papavaraceae
GROUP 2			
Myoporum sandwicense	E	naio	Myoporaceae
Panicum torridum	E	kakonakona	Poaceae
Heteropogon contortus	E	pili	Poaceae
Ipomoea tuboides	E	ipomea	Convolvulaceae
Boerhavia herbstii	E	alena	Nyctaginaceae
Doryopteris decipiens	E	ʻiwaʻiwa	Pteridaceae
Plumbago zeylanica	E	ʻilieʻe	Plumbaginaceae
GROUP 3			
Dodonaea viscosa	I	ʻaʻaliʻi	Sapindaceae
Sida fallax	I	ʻilima	Malvaceae
Boerhavia sp.	I	alena	Nyctaginaceae
Abutilon incanum	I	hoary abutilon	Malvaceae
Ipomoea indica	I	koali awahia	Convolvulaceae
Waltheria indica	I	ʻuhaloa	Malvaceae
Pellaea ternifolia	I	pellaea	Pteridaceae
Adiantum capillus-veneris	I	maidenhair fern	Pteridaceae

Group 1 = endemic (E) and indigenous (I) plants uncommon within the project area as well as elsewhere in the State, and/or of significance to life stages of the endangered Blackburn sphinx moth; Group 2 = relatively common endemic species throughout Hawaiʻi Group 3 = relatively common native species throughout Hawaiʻi.
** A single stunted ʻakoko was found within the project area in 2006; however, the plant was found to be dead in the late summer of 2007, and was not found at all during the 2008 surveys. Therefore, it is not considered in further plant density analysis for the purpose of defining boundaries of the native plant preserve.*

Based upon the observed distribution and composition of native plants within the Property, it is apparent that the southern ʻaʻā lava flow, which is demarcated by the stone wall that runs mauka makai across the northern margin of the flow, is a remnant native dry shrubland (Gagne and Cuddihy 1999). Many have stated that native dry forests and dry shrublands are among the most endangered ecosystems in Hawaiʻi, and as some believe, in the world (Rock 1913; Noss et al. 1995; Bruegmann 1996; Allen 2000; Cabin et al. 2000, 2001; Medeiros 2006, Altenberg 2007, 2010). Like many areas within the state, however, the intrinsic ecological significance of this remnant native habitat was not recognized until recently. Previous biological surveys of the Property dating back to the mid-1980 have failed to note this, and no government efforts were ever undertaken to protect this area as a remnant native dry forest. As it passed through numerous public zoning and entitlement processes over the years, the land was converted to urban district and approved for development without expressed concern from any county, state, or federal agency that the Property was of any interest or biological significance whatsoever. The

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southern portion of the Property was not recognized as containing components of a native dry shrubland ecosystem until the recent work of SWCA (2006) and Altenberg (2007). However, the Property's condition is most accurately described as highly degraded. As previously noted, the Property is zoned urban and has been slated for development since at least 1988. It has been subject to historic disturbances by wartime training maneuvers and uncontrolled grazing by feral ungulates, and it is crisscrossed by bulldozed access roads.

3.7.1 Listed Plant Species

No Federal or State of Hawaiʻi listed threatened or endangered plant species have been found on the Property (Char and Linney 1988; Char 1993, 2004; SWCA 2006; Altenberg 2007, SWCA 2009a). However, five individual plants of ʻāwikiwiki, a species proposed for listing as endangered have been found within the property.

3.7.1.1 ʻĀwikiwiki

Population, Biology and Distribution of ʻĀwikiwiki. ʻĀwikiwiki is a perennial climbing liana with pubescent, trifoliate leaves. The flowers occur in clusters of 8-20, and are typical of pea-like plants, usually colored a dark red, pink, or purple with a white spot and streaking at the base of the petals. Seed pond are 12-18 cm long (5-7 in), containing large brown to reddish brown seeds. Currently ʻāwikiwiki is uncommon, and used to be found in open, dry sites such as open lava fields, kiawe thickets, and dry forests at 15-540m (49-1770 feet) on Niʻihau, Kauaʻi, Lānaʻi, and leeward East Maui (Wagner et al 1990).

Current Threats to ʻĀwikiwiki. The remaining populations of ʻāwikiwiki on Maui are threatened by feral goats and axis deer that directly predate the plants, and degrade and destroy habitat by destroying native plants and disrupting topsoil, leading to erosion and establishment of introduced and invasive species. Because of anticipated increased impacts resulting from an increasing deer population, ʻāwikiwiki is believed to be in decline.

Occurrence of ʻĀwikiwiki on Maui and at the Property. The current remaining population is estimated at 200 individuals (USFWS 2012), in five scattered populations on East Maui, most of which are located on State lands: Keokea and Puʻu o Kali, Papaka Kai, southeast Pohakea, ʻAhihi Kinaʻu NAR, and Honuaʻula. All plants of this species that formerly were found in the Ahihi-Kinau Natural Area Reserve on Maui were destroyed by feral goats by the end of 2010. Five individual ʻāwikiwiki have been found within the Property by SWCA. All ʻāwikiwiki were flowering and fruiting during surveys conducted in March 2006; January, February and October 2007, and March 2008, and September 2009. The plants appeared to be healthy with no signs of damage or disease. Following the extensive drought in October 2010, ʻāwikiwiki stems at Honuaʻula were dry and leafless; however, seeds in pods were abundantly present on the desiccated vines. No seedlings were observed in subsequent pre- and post-drought reconnaissance surveys conducted by SWCA in the fall of 2010 and spring of 2011.

In 2009, USFWS chose not to pursue immediate issuance of a proposed listing rule for ʻāwikiwiki in lieu of higher priority listing actions, which include other candidate species with lower listing priority numbers (USFWS 2009). However, in 2011, USWFS announced that they expect to publish a proposed listing rule prior to the 2012 annual resubmitted 12-month petition finding (USFWS 2011), and on June 11, 2012 the USFWS proposed listing the species as endangered (USFWS 2012). Therefore the species is expected to become a listed species within the project lifetime. Continued status monitoring will be conducted as new information becomes available. The species is being addressed in this HCP instead of a CCAA (Candidate Conservation Agreement with Assurances) based upon the assumption that it will be listed as endangered in the near future. All five ʻāwikiwiki plants on the Property are proposed for protection within a proposed Native Plant Preservation Area (perpetual preservation easement). Therefore, it is not included as a Covered Species.

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3.8 Fauna

3.8.1 Surveys Conducted

Wildlife surveys of the Property were conducted by SWCA in March 2008 and in May 2009 (SWCA 2009b). Several preceding surveys have been conducted at the Property since 1988 (Bruner 1988, 1993, and 2004), in conjunction with above mentioned botanical surveys. During these surveys, no native birds, mammals, or invertebrates were observed on the Property (Bruner 1988, 1993, 2004).

3.8.2 Non-Listed Species

3.8.2.1 Birds

Bruner (1988, 1993, 2004) found no substantial changes in the abundance or composition of alien bird species on the Property between his surveys, encompassing a span of 16 years. In his most recent survey, Bruner (2004) found House finch (*Haemorhous mexicanus*), Japanese white-eye (*Zosterops japonicus*), black francolin (*Francolinus francolinus*), and zebra dove (*Geopelia striata*) to be the most abundant birds on the Property. SWCA recorded 16 species of introduced birds on the Property (Table 3-2). The most abundant alien birds during these surveys were Japanese white-eye (*Zosterops japonicus*), nutmeg manikin (*Lonchura punctulata*), zebra dove (*Geopelia striata*), and northern cardinal (*Cardinalis cardinalis*). Along the southern border of the Property African silverbills (*Lonchura cantans*) and red-crested cardinals (*Paroaria coronata*) were more common (SWCA 2009b). SWCA (2009b) recorded four alien bird species that were not recorded by Bruner (1988, 1993, and 2004): cattle egret (*Bulbulcus ibis*), mourning doves (*Zenaida macroura*), chestnut munias (*Lonchura atricapilla*), and Erckel's francolin (*Francolinus erckelli*). The latter was based on an auditory observation. This species has never before been recorded from Maui, and this observation may represent a misidentification. These birds were relatively rare. In addition, surveys were done by SWCA for off-site areas impacted by creation and/or improvements of waterlines, but no significant findings were reported in terms of sensitive or listed native species (SWCA 2009b). Additional surveys were conducted by Xamanek Researches (1994) and no sensitive or native species were documented.

Besides the Hawaiian short-eared owl, or pueo (*Asio flammeus sandwichensis*), the only resident native bird detected on the Property is the cosmopolitan black-crowned night heron, or aukuʻu (*Nycticorax nycticorax*). One black-crowned night heron was observed flying across the Property (SWCA 2009b). Visiting migratory species were seen on the Property during chance, or opportunistic sightings. SWCA biologists have seen Pacific golden plovers (*Pluvialis fulva*) on several occasions during the winter months on lawns and golf courses adjacent to the Property, and Bruner (1988) recorded one Pacific golden plover during his February 1988 survey of the Property. One northern harrier (*Circus cyaneus*), which is not commonly sighted in the Hawaiian Islands, was seen flying over the Property in 2006 by an SWCA biologist (SWCA 2009b).

Although seabirds spend most of their time over the ocean, they nest on land, and may fly over the Property to and from their nesting sites, or in search of fresh water or thermals. Non-listed seabirds that may be seen over the Property include the great frigatebird (*Fregata minor*) and tropicbirds (*Phaeton* spp.).

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Table 3-2: Bird species and relative abundance observed on the Honuaʻula Project site during SWCA's (2009b) bird surveys in May and September 2008.

Species	Common Name	Status	Birds per point count (n=30)	Abundance Rank
Asio flammeus sandwichensis	Pueo	N (NR)	x	-
Bubulcus ibis	Cattle Egret	I (NR)	x	-
Zenaida macroura	Mourning Dove	I (NR)	0.03	12
Francolinus erckelli[1]	Erckel's Francolin	I (NR)	0.03	12
Francolinus pondicerianus	Gray Francolin	I	0.23	9
Francolinus francolinus	Black Francolin	I	0.73	5
Streptopelia chinensis	Spotted Dove	I	0.30	7
Geopelia striata	Zebra Dove	I	1.70	3
Tyto alba	Barn owl	I	x	-
Zosterops japonicus	Japanese White eye	I	3.50	1
Mimus polyglottos	Common Mockingbird	I	0.03	12
Acridotheres tristis	Common Myna	I	0.07	11
Cardinalis cardinalis	Northern Cardinal	I	1.3	4
Carpodacus mexicanus	House Finch	I	0.23	9
Lonchura punctulata	Nutmeg Mannikin	I	3.03	2
Lonchura atricapilla	Chestnut Munia	I (NR)	x	-
Lonchura cantans	African Silverbill	I	0.67	6

I = introduced, N = native NR = new record since 2004
X - observed outside point counts

[1]This was a single auditory observation outside of the point counts. This species has never before been recorded on Maui, and this is likely a misidentification.

3.8.2.2 Hawaiian Short-eared Owl or Pueo

Population, Biology and Distribution of Pueo. The Hawaiian short-eared owl is an endemic subspecies of the nearly cosmopolitan short-eared owl (*Asio flammeus*). This is the only extant owl native to Hawaiʻi and is found on all the main islands from sea level to 8,000 ft (2,450 m). The Hawaiian short-eared owl is listed by the State of Hawaiʻi as endangered on the Island of Oʻahu, but not listed on Maui.

Unlike most owls, Hawaiian short-eared owls are active during the day (Mostello 1996; Mitchell et al. 2005), though nocturnal or crepuscular activity has also been documented (Mostello 1996). Hawaiian short-eared owls are commonly seen hovering or soaring over open areas (Mitchell et al. 2005).

No surveys have been conducted to date to estimate the population size of Hawaiian short-eared owl. The species was widespread at the end of the 19th century, but numbers are thought to be declining (Mostello 1996; Mitchell et al. 2005).

Hawaiian short-eared owl occupy a variety of habitats, including wet and dry forests, but are most common in open habitats, such as grasslands, shrublands and montane parklands, including urban areas and those actively managed for conservation (Mitchell et al. 2005). Evidence indicates the owls became established in Hawaiʻi in relatively recent history, with their population likely tied to the introduction of Polynesian rats (*Rattus exulans*) to the islands by Polynesians.

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Pellet analyses indicate that rodents, birds and insects, respectively, are their most common prey items of Hawaiian short-eared owls (Snetsinger et al. 1994; Mostello 1996). Hawaiian short-eared owl prey includes passerines, seabirds and shorebirds (Snetsinger et al. 1994; Mostello 1996; Mounce 2008). The Hawaiian short-eared owl relies more heavily on birds and insects than its continental relatives (Snetsinger et al. 1994), likely because of the low rodent diversity of the Hawaiian Islands (Mostello 1996).

Hawaiian short-eared owls nest on the ground. Little is known about their breeding biology, but nests have been found throughout the year. Nests are constructed by females and consist of simple scrapes in the ground lined with grasses and feather down. Females perform all incubating and brooding, while males feed females and defend nests. The young may leave the nest on foot before they are able to fly and depend on their parents for approximately two months (Mitchell et al. 2005).

Current Threats to Pueo. Loss and degradation of habitat, predation by introduced mammals, and disease threaten the Hawaiian short-eared owl. Hawaiian short-eared owls appear particularly sensitive to habitat loss and fragmentation. Ground nesting birds are more susceptible to the increased predation pressure that is typical within fragmented habitats and near rural developments (Wiggins et al. 2006). These nesting habits make them increasingly vulnerable to predation by rats, cats and the small Indian mongoose (Mostello 1996; Mitchell et al. 2005).

Some mortality of Hawaiian short-eared owls on Kauaʻi has been attributed to "sick owl syndrome," which may be caused by pesticide poisoning or food shortages. They may be vulnerable to the ingestion of poisoned rodents. However, in the one study on mortality that has been conducted, no evidence was found that organochlorine, organophosphorus, or carbamate pesticides caused mortality in Hawaiian short-eared owls (Thierry and Hale 1996). Other causes of death on Maui, Oʻahu, and Kauaʻi have been attributed to trauma (apparently vehicular collisions), emaciation, and infectious disease (pasteurellosis) (Thierry and Hale 1996). However, persistence of these owls in lowland, non-native and rangeland habitats suggests that they may be less vulnerable to extinction than other native birds. This is likely because they may be resistant to avian malaria and avian pox (Mitchell et al. 2005), and because they are opportunistic predators that feed on a wide range of small animals.

Occurrence of Pueo on Maui and at the Property. Six pueo have been observed on the Property over the course of SWCA's wildlife surveys (2009b) and associated field trips (Figure 3.4). Twelve (12) barn owls (*Tyto alba*) and six other unidentified owls have been sighted in the kiawe-buffelgrass grasslands in the northern portion of the Property. No pueo or barn owls have been sighted in the southern kiawe-wiliwili shrubland, and no nests were found anywhere on the Property. Bruner (1988, 1993, and 2004) did not record any pueo in the Property during any of his surveys.

3.8.2.3 Herpetofauna

There are no native land reptiles or amphibians in Hawaiʻi (McKeown 1996). Geckos (Gekkonidae) were heard calling by SWCA (2009b) on the Property and along jeep roads on the southern border of the Property, but were not seen. No skinks (Scincidae) or amphibians have been recorded at the Property.

3.8.2.4 Mammals

Historically, the Property has been exposed to cattle (*Bos taurus*) grazing. Feral goats (*Capra hircus*) and axis deer (*Axis axis*) have had unrestricted access to the Property and pose a serious threat to the native plant species and the integrity of the remnant mixed kiawe-wiliwili shrubland. Recently, Honuaʻula Partners, LLC constructed a cattle fence preventing cattle from entering the kiawe-wiliwili shrubland in the southern portion of the Property, but cattle are still occasionally grazed within the northern portion of the Property and more regularly east of the Property on lands owned by Ulupalakua Ranch. SWCA (2009b) did not record presence or evidence of cattle, but following their survey cattle were allowed to graze within the northern kiawe-buffelgrass lands on the Property. Small herds of 4 to 30 axis deer were commonly seen during recent surveys of the

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Property (SWCA 2009b), and deer scat, tracks, and evidence of buck rubs (rubbing of antlers on trees) were commonly seen. Deer have also been recorded on the Property by Bruner (1988, 1993, and 2004). Although there are reports of goats on the Property, none were observed during any of the surveys. Mongoose (*Herpestes javanicus*) have been recorded on the Property by Bruner (1988, 1993, and 2004), and have more recently been observed on the Property by SWCA biologists. Other small mammals, including cats (*Felis catus*), rats (*Rattus* spp.), and mice (*Mus musculus*), are likely present on the Property due to its proximity to the Maui Meadows subdivision and the Wailea Resort (Figure 1.1). The fact that they have not been recorded on the Property may be due to their nocturnal, secretive, and cryptic nature. Rodent remains have been detected in owl pellets found on the Property.

3.8.3 Listed Wildlife Species with no requested take

None of the four endangered Hawaiian waterbird species or the two endangered seabird species are known to occur within the Property, and no suitable habitat for these species exists there. However, these six species may be attracted to portions of the Property (USFWS 1995) following construction. Although no water features are planned for the golf course, the waterbirds may be attracted to golf course fairways and greens, and juvenile seabirds may be attracted and disoriented by lights on the Property.

The Hawaiian hoary bat has been observed only once at the Property (SWCA 2009b), and low numbers of bats, if any, may use trees within the property for roosting and/or pupping.

3.8.3.1 Hawaiian Hoary Bat

<u>Population, Biology and Distribution of the Hoary Bat.</u> The Hawaiian hoary bat is the only existing native terrestrial mammal from the Hawaiian archipelago (USFWS 1998). The species has been recorded on Kauaʻi, Oʻahu, Molokaʻi, Maui, and Hawaiʻi, but no historical population estimates or information exist for this subspecies. Population estimates for all islands in the state in the recent past have ranged from hundreds to a few thousand bats (Menard 2001). The Hawaiian hoary bat is believed to occur primarily below an elevation of 4,000 feet (1,220 m). This subspecies has been recorded between sea level and approximately 9,050 feet (2,760 m) in elevation on Maui, with most records occurring at or below approximately 2,060 feet (628 m) (USFWS 1998).

Hawaiian hoary bats roost in native and non-native vegetation from 3 to 29 feet (1 to 9 m) above ground level. They have been observed roosting in ʻōhiʻa, hala (*Pandanus tectorius*), and coconut palms (*Cocos nucifera*), kukui (*Aleurites moluccana*), kiawe (*Proscopis pallida*), avocado (*Persea americana*), mango (*Mangifera indica*), shower trees (*Cassia javanica*), pūkiawe *(Leptecophylla tameiameiae*), and fern clumps; they are also suspected to roost in eucalyptus (*Eucalyptus* spp.) and Sugi pine (*Cyrptomeria japonica*) stands. The species is rarely observed using lava tubes, cracks in rocks, or man-made structures for roosting. While roosting during the day, Hawaiian hoary bat are solitary, although mothers and pups roost together (USFWS 1998). Home range sizes of Hawaiian hoary bats vary, and core areas often include nighttime roosts, but not daytime roosts. Roosting and feeding may be disjunctive, as indicated by the long average length of calculated home ranges (USGS, unpublished data).

It is thought that breeding occurs primarily between April and August. Breeding has only been documented on the islands of Hawaiʻi and Kauaʻi (Baldwin 1950; Kepler and Scott 1990; Menard 2001). It is not known whether bats observed on other islands breed locally or only visit these islands during non-breeding periods. Seasonal changes in the abundance of Hawaiian hoary bats at different elevations indicate that altitudinal migrations occur on the Island of Hawaiʻi. During the breeding period, Hawaiian hoary bat occurrences increase in the lowlands and decrease at high elevation habitats. Hawaiian hoary bat occurrences are especially low from June until August in high elevation areas. In the winter, especially during the post-lactation period in October, bat occurrences increase in high elevation areas and in the central highlands, possibly receiving bats from the lowlands (Menard 2001).

Hawaiian hoary bats feed on a variety of native and non-native night-flying insects, including moths, beetles, crickets, mosquitoes and termites (Whitaker and Tomich 1983). They appear to

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prefer moths ranging between 0.60 and 0.89 inches (16 to 20 mm) in size (Bellwood and Fullard 1984; Fullard 2001). Prey is located using echolocation. Water courses and edges (e.g., coastlines and forest/pasture boundaries) appear to be important foraging areas. In addition, the species is attracted to insects that congregate near lights (USFWS 1998; Mitchell et al. 2005). They begin foraging either just before or after sunset depending on the time of year (USFWS 1998; Mitchell et al. 2005).

Current Threats to the Hoary Bat. The availability of roosting sites is believed to be a major limitation in many bat species. Possible threats to the Hawaiian hoary bat include pesticides (either directly or by impacting prey species), predation, alteration of prey availability due to the introduction of non-native insects, and roost disturbance (USFWS 1998). Management of the Hawaiian hoary bat is also limited by a lack of information on key roosting and foraging areas, food habits, seasonal movements and reliable population estimates (USFWS 1998).

Occurrence of the Hoary Bat on Maui and at the Property. On Maui, the bat is believed to occur primarily in moist, forested areas, although little is known about its exact distribution and habitat use on the island. SWCA biologists sighted a single Hawaiian hoary bat at the southern boundary of the project area flying seaward at 18:44 hours on September 19, 2008 (Figure 3.4). Echolocation calls from this individual were simultaneously recorded on the Anabat detector. No other sightings of bats have been made at the Property, and no evidence of roosting or foraging has been observed.

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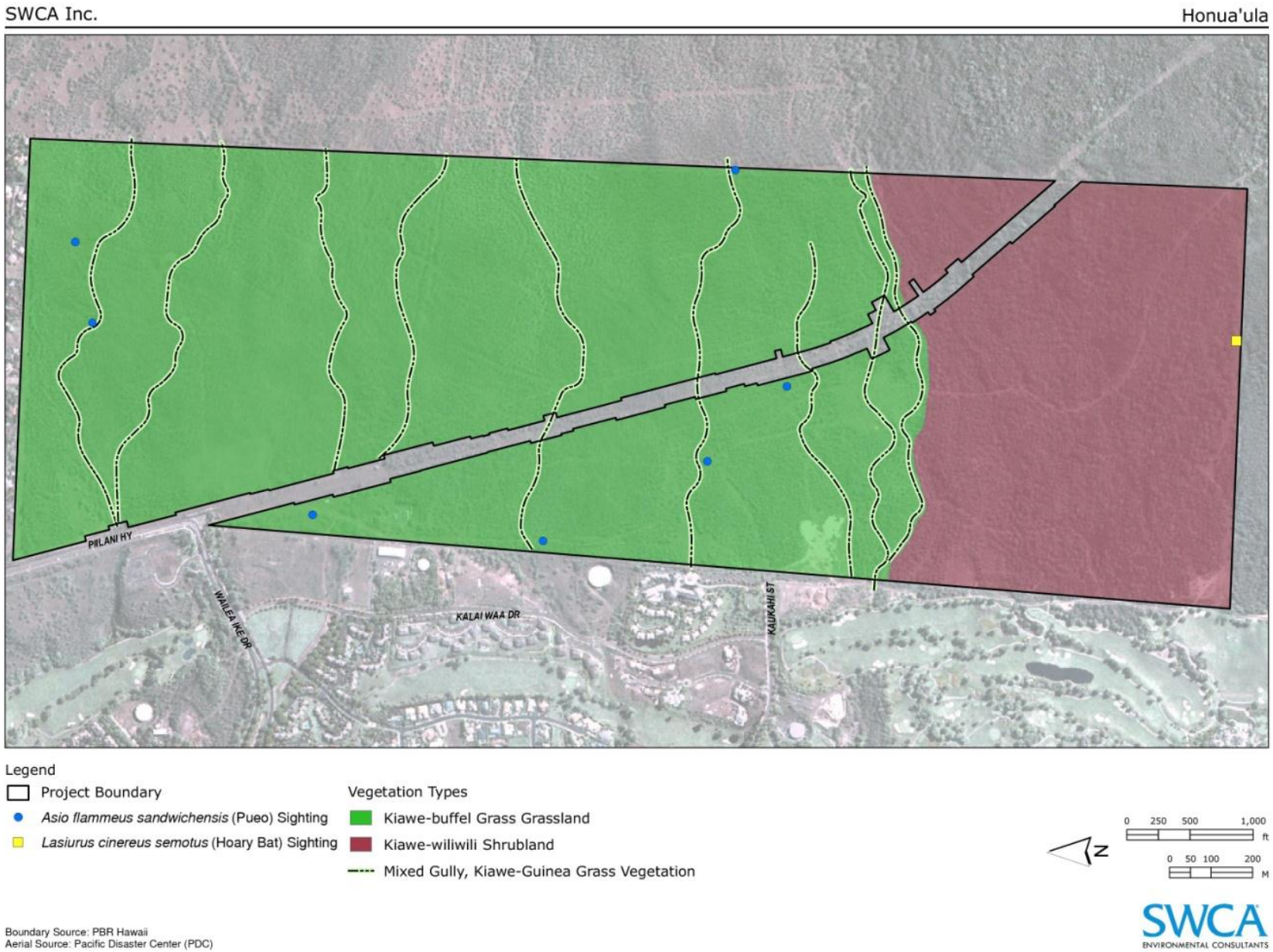
Figure 3.4: Owl and bat sightings on the Property



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3.8.3.2 Hawaiian Petrel

Population, Biology and Distribution of Hawaiian Petrels. Hawaiian petrel was once abundant on all main Hawaiian Islands except Niʻihau (Mitchell et al. 2005). The population was most recently estimated to be approximately 20,000, with 4,000 to 5,000 breeding pairs (Mitchell et al. 2005). Today, Hawaiian petrels continue to breed in high-elevation colonies on Maui, Hawaiʻi, Kauaʻi and Lānaʻi (Richardson and Woodside 1954; Simons and Hodges 1998; Telfer et al. 1987). Radar studies conducted in 2002 also suggest that breeding may occur on Molokaʻi (Day and Cooper 2002). It is believed that breeding no longer occurs on Oʻahu (Harrison 1990).

Survey work at a recently re-discovered Hawaiian petrel colony on Lānaʻi, that had been previously thought to be extirpated, indicates that thousands of birds are present, rather than hundreds of birds as first assumed; and that the size of the breeding colony approaches that at Haleakalā, Maui, where as many as 1,000 pairs have been thought to nest annually (Mitchell et al. 2005; Tetra Tech EC, Inc. 2008a, 2008b). Hawaiian petrels are nocturnal and subsist primarily on squid, fish and crustaceans caught near the sea surface. Unlike shearwaters, Hawaiian petrels are not known to dive or swim below the surface (Pitman 1986). Foraging may take place thousands of kilometers from their home islands during both breeding and non-breeding seasons (Spear et al. 1995). In fact, recent studies conducted using satellites and transmitters attached to Hawaiian petrels have shown that they can range across more than 6,200 miles (10,000 km) during two-week foraging expeditions (Adams 2008).

Hawaiian petrels are active in their nesting colonies for about eight months each year. The birds are long-lived (ca. 30 years) and return to the same nesting burrows each year between March and April. Present-day Hawaiian petrel colonies are typically located at high elevations above 2,500 meters (8,200 ft). The types of habitats used for nesting are very diverse and range from xeric habitats with little or no vegetation, such as at Haleakalā National Park on Maui, to wet forests dominated by ʻōhiʻa with uluhe understory as those found on Kauaʻi (Mitchell et al. 2005). Females lay only one egg per year, which is incubated alternately by both parents for approximately 55 days. Eggs hatch in June or July, after which both adults fly to sea to feed and return to feed the nestling. The fledged young depart for sea in October and November. Adult birds do not breed until age six and may not breed every year, but pre-breeding and non-breeding birds nevertheless return to the colony each year to socialize.

Current Threats to Hawaiian Petrels. The most serious land-based threat to the species is predation of eggs and young in the breeding colonies by introduced mammalian predators such as small Indian mongoose, feral cats, owls, pigs, dogs and rats. Population modeling by Simons (1984) suggests that this species could face extinction in a few decades if predation is not controlled. Intensive trapping and habitat protection has helped to improve nesting and fledging success (Ainley et al. 1997). Hodges and Nagata (2001) found that nesting activity (signs of burrow activity) in sites protected from predators on Haleakalā ranged from 37.25% to 78.13% while nesting activity in unprotected sites ranged from 23.08 to 88.17%. Nesting success (proportion of active burrows that showed signs of fledging chicks) in protected sites ranged from 16.97% to 50.00%, while nesting success in unprotected sites ranges from 0.00 to 44.00% averaging 42.4% and 27.1% respectively (Hodges and Nagata 2001).

Ungulates can indirectly affect nesting seabirds by overgrazing and trampling vegetation, as well as facilitating erosion. Climatic events such as El Niño can also impact the reproductive success of seabirds (Hodges and Nagata 2001). Other threats include occasional mortality from collisions with power lines, fences, and other structures near breeding sites or attraction to bright lights. In addition, juvenile birds are sometimes grounded when they become disoriented by lights on their nocturnal first flight from inland breeding sites to the ocean. A few, mostly juvenile, Hawaiian petrels have landed in brightly lighted areas at scattered locations on Maui most years. The problem is much smaller than the one involving Newell's shearwaters, and Simons and Hodges (1998) conclude that it is probably not a threat to remaining populations.

Occurrence of Hawaiian Petrels on Maui and at the Property. Haleakalā supports the largest known nesting colony of Hawaiian petrels (USFWS 2005; Hodges and Nagata 2001). Approximately 1,000 known nests are within the crater of the dormant shield volcano, with the highest concentration on

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the western rim between 2,400 and 3,055 m elevation. This population estimate may be an underestimate according to Cooper and Day (2003). The highest densities of nests (15-30 burrows per hectare) occur within Haleakalā National Park. Predator trapping is conducted year-round to reduce predation pressure on these burrows. Lower densities of nesting burrows occur elsewhere in the crater and beyond the park boundaries, but these are currently not actively managed (Hodges and Nagata 2001). Radar studies indicate that the majority of petrels flying inland towards their nesting sites on Haleakalā choose a flight path that may minimize their overland flight, and the number of birds recorded flying over Mākena were relatively low (Cooper & Day 2003). No Hawaiian Petrels have been observed at the Property during any of the surveys.

3.8.3.3 Newell's Shearwater

Population, Biology, and Distribution of Newell's Shearwater. The Newell's shearwater is an endemic Hawaiian sub-species of the nominate species Townsend's shearwater (*Puffinus a. auricularis*) of the eastern Pacific. The Newell's shearwater is considered "Highly Imperiled" in the Regional Seabird Conservation Plan (USFWS 2005) and the North American Waterbird Conservation Plan (Kushlan et al. 2002). Species identified as "Highly Imperiled" have suffered significant population declines and have either low populations or some other high risk factor.

The most recent population estimate of Newell's shearwater was approximately 84,000 birds, with a possible range of 57,000 to 115,000 birds (Ainley et al. 1997). The largest breeding population of Newell's shearwater occurs on Kauaʻi (Telfer et al. 1987; Day and Cooper 1995; Ainley et al. 1995, 1997b; Day et al. 2003). Breeding also occurs on Hawaiʻi Island (Reynolds and Richotte 1997; Reynolds et al. 1997; Day et al. 2003a) and almost certainly occurs on Molokaʻi (Pratt 1988; Day and Cooper 2002). Recent radar studies suggest the species may also nest on Oʻahu (Day and Cooper 2008).

Newell's shearwaters typically nest on steep slopes vegetated by uluhe fern (*Dicranopteris linearis*) undergrowth and scattered ʻōhiʻa (*Metrosideros polymorpha*) trees. Currently, most Newell's shearwater colonies are found from 525 to 3,900 feet (160 to 1,200 m) above mean sea level, often in isolated locations and/or on slopes greater than 65 degrees (Ainley et al. 1997). The birds nest in short burrows excavated into crumbly volcanic rock and ground, usually under dense vegetation and at the base of trees. A single egg is laid in the burrow and one adult bird incubates the egg while the second adult goes to sea to feed. Once the chick has hatched and is large enough to withstand the cool temperatures of the mountains, both parents go to sea and return irregularly to feed the chick. The closely related Manx shearwater is fed every 1.2-1.3 days (Ainley et al. 1997). Newell's shearwaters arrive at and leave their burrows during darkness and birds are seldom seen near land during daylight hours. During the day, adults remain either in their burrows or at sea some distance from land.

First breeding occurs at approximately six years of age, after which breeding pairs produce one egg in a given year. A high rate of non-breeding is found among experienced adults that occupy breeding colonies during the summer breeding season, similar to some other seabird 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; egg-laying begins in the first two weeks of June and likely continues through the early part of July. Pairs produce one egg, and the average incubation period is thought to be approximately 51 days (Telfer 1986). The fledging period is approximately 90 days, and most fledging takes place in October and November, with a few birds still fledging into December (SOS Unpubl. data).

Current Threats to Newell's Shearwater. Radar studies on Kauaʻi show a 63% decrease in detections of shearwaters between 1993 and 2001 (Day et al. 2003a). It was presumed that the decrease in detections corresponded to an actual decrease in population, rather than simply a shift in areas used for breeding. Declines in Newell's shearwater populations are attributed to loss of nesting habitat, predation by introduced mammals (mongoose, feral cats, rats, and feral pigs) at

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nesting sites, and fallout of juvenile birds associated with disorientation from urban lighting (Ainley et al. 1997; Mitchell et al. 2005; Hays and Conant 2007).

Occurrence of Newell's Shearwater on Maui and at the Property. The Newell's shearwater was first discovered on Maui when several birds of the species were taken to Mr. M. Newell by Hawaiians in 1894 (Sincock and Swedberg, 1969). In 1931, Peters (1931) considered the species extinct. According to Munro (1944) any possible remnant colonies would be located on Kauaʻi, which was the only major island from which mongoose were absent, but in 1954 an adult Newell's shearwater was recovered from a sugar mill in ʻAiea, Oʻahu (Richardson 1955). Sincock and Swedberg (1969) were the first to reconfirm breeding on Kauaʻi. There is no indisputable evidence of Newell's shearwater nesting on Maui (Ainley et al. 1997). In 1983, one live bird was found near Peahi Reservoir in eastern Maui on July 13, 1983 (Pyle 1983). Further evidence comes from a very small number of grounded juveniles during the fall fledging season on Maui, but it is unclear whether these fledged from Maui or if these were individuals from other islands that were attracted by coastal lights. On average, one fledgling is found on the island per year (Cooper and Day 2003). Radar observations further suggest that small numbers of Newell's shearwater may be nesting inland in eastern and western Maui (Cooper and Day 2003), but more study is needed to unequivocally confirm the presence of breeding Newell's shearwater on Maui. No Newell's shearwaters were observed at the Property during any of the surveys.

3.8.3.4 Hawaiian Stilt

Population, Biology and Distribution of the Hawaiian Stilt. The Hawaiian stilt is a non-migratory endemic subspecies of the black-necked stilt (*Himantopus mexicanus mexicanus*). The black-necked stilt occurs in the western and southern portions of North America, southward through Central America, West Indies, to southern South America and also the Hawaiian Archipelago (Robinson et al. 1999). Hawaiian stilt and black-necked stilt are part of a super-species complex of stilts found in various parts of the world (Pratt et al. 1987; Robinson et al. 1999). The *U.S. Pacific Islands Regional Shorebird Conservation Plan* considers the Hawaiian stilt as highly imperiled because of its low population level (Engilis and Naughton 2004). Over the past 25 years, the Hawaiian stilt population has shown a general upward trend statewide. Annual summer and winter counts have shown variability from year to year. This fluctuation can be attributed to winter rainfall and variation in reproductive success (Engilis and Pratt 1993; USFWS 2005a). The state population size has recently fluctuated between 1,200 to 1,500 individuals with a five-year average of 1,350 birds (USFWS 2005a). Adult and juvenile dispersal has been observed both intra- and inter-island within the state (Reed et al. 1998).

Oʻahu supports the largest number of stilts in the state, with an estimated 35 to 50% of the population residing on the island. Some of the largest concentrations can be found at the James Campbell NWR, Kahuku aquaculture ponds, Pearl Harbor NWR, and Nuʻupia Ponds in Kāneʻohe (USFWS 2005a). The Kiʻi Unit of the James Campbell NWR, and the Waiawa Unit and Pond 2 of the Honouliuli Unit of the Pearl Harbor NWR are the most productive stilt habitats, with birds numbering near 100 or above during survey counts (USFWS 2002; USFWS unpubl. data). Hatching success of stilt nests has been greater than 80% in the Kiʻi Unit, but chick mortality rates are high (USFWS 2002).

Hawaiian stilts favor open wetland habitats with minimal vegetative cover and water depths of less than 9.4 inches (24 cm), as well as tidal mudflats (Robinson et al. 1999). Stilts feed on small fish, crabs, polychaete worms, terrestrial and aquatic insects, and tadpoles (Robinson et al. 1999; Rauzon and Drigot 2002). Hawaiian stilts tend to be opportunistic users of ephemeral wetlands to exploit the seasonal abundance of food (Berger 1972; USFWS 2005a). Hawaiian stilts nest from mid-February through late August with variable peak nesting from year to year (Robinson et al. 1999). Nesting sites for stilts consist of simple scrapes on low relief islands within and/or adjacent to ponds. Clutch size averages four eggs (Hawaiʻi Audubon Society 2005; USFWS 2005a).

Current Threats to the Hawaiian Stilt. The most important causes of decline of the Hawaiian stilt and other Hawaiian waterbirds is the loss of wetland habitat and predation by introduced animals. Barn owls and the endemic Hawaiian short-eared owl are known predators of adult stilts and possibly their young (Robinson et al. 1999; USFWS 2005a). Known predators of eggs, nestlings,

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and/or young stilts include small Indian mongoose, feral cat, rats, feral and domestic dogs, black crowned night-heron, cattle egret, common mynah, ruddy turnstone, laughing gull (*Larus atricilla*), American bullfrog (*Rana catesbeiana*), and large fish (Robinson et al. 1999; USFWS 2005a). A study conducted at the Kiʻi Unit of the James Campbell NWR between 2003 and 2004 attributed 45% of stilt chick losses to bullfrog predation over the two breeding periods (USFWS, unpublished data). The Kiʻi Unit has on-going control programs for mongoose, feral cats, rats, cane toads (*Bufo marinus*), and bullfrogs (Silbernagle/USFWS, pers. comm.). Other factors that have contributed to population declines in Hawaiian stilts include altered hydrology, alteration of habitat by invasive non-native plants, disease, and possibly environmental contaminants (USFWS 2005a). Although the Hawaiian stilt is considered imperiled, it is believed to have high recovery potential with a moderate degree of threat.

Occurrence of Hawaiian Stilt on Maui and at the Property. The Maui population of Hawaiian stilts has ranged between approximately 250 and 530 birds, and is largely supported by Maui's two large coastal wetlands: Kealia and Kanahā. The most important nesting habitat is at Kealia, and small numbers of stilts also frequent aquaculture facilities on the island (USFWS 2005). Stilts are highly mobile and monthly counts indicate that birds move freely between wetlands, likely in search of optimal foraging habitat (Ueoka 1997). No Hawaiian stilts were observed at the Property during any of the surveys.

3.8.3.5 Hawaiian Coot

Population, Biology and Distribution of the Hawaiian Coot. The Hawaiian coot is an endangered species endemic to the main Hawaiian Islands, except Kahoʻolawe. The Hawaiian coot is non-migratory and believed to have originated from migrant American coots (*Fulica americana*) that strayed from North America. The species is an occasional vagrant to the northwestern Hawaiian Islands west to Kure Atoll (Pratt et al. 1987; Brisbin et al. 2002).

The population of Hawaiian coot has fluctuated between 2,000 and 4,000 birds. Of this total, roughly 80% occur on Oʻahu, Maui, and Kauaʻi (Engilis and Pratt 1993; USFWS 2005a). The Oʻahu population fluctuates between approximately 500 to 1,000 birds. Hawaiian coots occur regularly in the Kiʻi Unit of the James Campbell NWR, with peak counts in 2005 and 2006 reaching nearly 350 birds (USFWS 2002, 2005a, unpubl. data). Population fluctuations in these areas are attributed to seasonal rainfall and variation in reproductive success. Inter-island dispersal has been noted and is presumably influenced by seasonal rainfall patterns and food abundance (USFWS 2005a).

Coots are usually found on the coastal plain of islands and prefer freshwater ponds or wetlands, brackish wetlands, and man-made impoundments. They prefer open water that is less than 11.8 inches (30 cm) deep for foraging. Preferred nesting habitat has open water with emergent aquatic vegetation or heavy stands of grass (Schwartz and Schwartz 1949; Brisbin et al. 2002; USFWS 2005a). Nesting occurs mostly from March through September, with opportunistic nesting occurring year round depending on rainfall. Hawaiian coots will construct floating nests of aquatic vegetation, semi-floating nests attached to emergent vegetation or nests in clumps of wetland vegetation (Brisbin et al. 2002; USFWS 2005a). False nests are also sometimes constructed and used for resting or as brooding platforms (USFWS 2005a). Coots feed on seeds, roots and leaves of aquatic and terrestrial plants, freshwater snails, crustaceans, tadpoles of bullfrogs and marine toads, small fish, and aquatic and terrestrial insects (Schwartz and Schwartz 1949; Brisbin et al. 2002).

Current Threats to the Hawaiian Coot. Similar to the other listed waterbirds, the recovery of the Hawaiian coot is limited by habitat loss and degradation (USFWS 2005(a)). According to the USFWS *Second Draft Recovery Plan for Hawaiian Waterbirds* (2005a) the Hawaiian coot has a high potential for recovery and a low degree of threats (USFWS 2005a). Introduced feral cats, feral and domestic dogs, and mongoose are the main predators of adult and young Hawaiian coots (Brisbin et al. 2002; Winter 2003). Other predators of young coots include black-crowned night heron, cattle egret and large fish. Coots are susceptible to avian botulism outbreaks in the Hawaiian Islands (Brisbin et al. 2002).

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Occurrence of the Hawaiian Coot on Maui and at the Property. The population of Hawaiian coot on Maui has fluctuated between approximately 200-600 birds, with the largest concentrations found at Kanahā and Kealia ponds. The species is highly mobile and individuals move frequently between these wetlands (USFWS 2005a). No Hawaiian coots were observed at the Property during any of the surveys.

3.8.3.6 Hawaiian Duck

Population, Biology and Distribution of the Hawaiian Duck. The Hawaiian duck is a non-migratory species endemic to the Hawaiian Islands, and the only endemic duck extant in the main Hawaiian Islands (Uyehara et al. 2008). The Hawaiian duck is a small, mottled brown duck with emerald green to blue patches on their wings (speculums). Males are typically larger, have distinctive dark brown chevrons on the breast feathers, an olive-colored bill, and bright orange feet. Females are slightly smaller and lighter in color (Evans et al. 1994; USFWS 2005a). Compared to feral mallard ducks, Hawaiian ducks are more cryptic and about 20 to 30% smaller (Uyehara et al. 2007).

The historical range of the Hawaiian duck includes all the main Hawaiian Islands, except for the Islands of Lānaʻi and Kahoʻolawe. Hawaiian ducks are strong flyers and usually fly at low altitudes. Intra-island movement has been recorded, where they may move between ephemeral wetlands or disperse to montane areas during the breeding season (Engilis et al. 2002). Hawaiian ducks also fly inter-island and have been documented to fly regularly between Niʻihau and Kauaʻi in response to above-normal precipitation and the flooding and drying of Niʻihau's ephemeral wetlands (USFWS 2005a). Hawaiian ducks occur in aquatic habitats up to an altitude of 10,000 ft (3,048 m) in elevation (Uyehara et al. 2007). The only naturally occurring population of Hawaiian duck exists on Kauaʻi, with reintroduced populations on Oʻahu, Hawaiʻi and Maui (Pratt et al. 1987; Engilis et al. 2002; Hawaiʻi Audubon Society 2005).

Hawaiian ducks are closely related to mallards (Browne et al. 1993). Due to this close genetic relationship, Hawaiian ducks will readily hybridize with mallards and allozyme data indicate there has been extensive hybridization between Hawaiian duck and feral mallards on Oʻahu, with the near disappearance of Hawaiian duck alleles from the population on the island (Browne et al. 1993). Uyehara et al. (2007) found a predominance of hybrids on Oʻahu and samples collected by Browne et al. (1993) from ducks and eggs at the Kiʻi Unit of the James Campbell NWR found mallard genotypes. In 2005, a peak count of 141 Hawaiian duck x mallard hybrids was recorded on the Kiʻi Unit of the James Campbell NWR (USFWS unpub). Populations on Maui are also suspected to largely consist of Hawaiian duck x mallard hybrids. Estimated Hawaiian duck hybrid counts on these islands are 300 and 50 birds, respectively (Engilis et al. 2002; USFWS 2005a). The current wild population of pure Hawaiian ducks is estimated at approximately 2,200 birds. Approximately 200 pure individuals occur on the Island of Hawaiʻi and the remainder resides on Kauaʻi. Because of similarities between the species, it can be difficult to distinguish between pure Hawaiian ducks, feral hen mallards, and hybrids during field studies.

Habitat types utilized by the Hawaiian duck include natural and man-made lowland wetlands, flooded grasslands, river valleys, mountain streams, montane pools, forest swamplands, aquaculture ponds, and agricultural areas (Engilis et al. 2002; Hawaiʻi Audubon Society 2005; USFWS 2005a). The James Campbell NWR provides suitable habitat for foraging, resting, pair formation, and breeding (Engilis et al. 2002). No suitable habitat for Hawaiian duck occurs on the Honuaʻula Property.

Breeding occurs year-round, although the majority of nesting occurs from March through June. The peak breeding season on Kauaʻi occurs between December and May and the peak on Hawaiʻi occurs from April to June (Uyehara et al. 2008). Nests are placed in dense shoreline vegetation of small ponds, streams, ditches and reservoirs (Engilis et al. 2002). Types of vegetation associated with nesting sites of Hawaiian duck include grasses, rhizomatous ferns and shrubs (Engilis et al. 2002). The diet of Hawaiian ducks consists of aquatic invertebrates, aquatic plants, seeds, grains, green algae, aquatic mollusks, crustaceans and tadpoles (Engilis et al. 2002; USFWS 2005a).

Current Threats to the Hawaiian Duck. Loss of habitat and hybridization with mallards are the largest threats to the Hawaiian duck. In addition, Hawaiian ducks are predated by mongoose, feral

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cats, feral dogs, and possibly rats (Engilis et al. 2002). Black-crowned night herons, largemouth bass (*Micropterus salmoides*), and bullfrogs have also been observed to take ducklings (Engilis et al. 2002). Avian diseases are another threat to Hawaiian ducks, with outbreaks of avian botulism (*Clostridium botulinum*) occurring annually throughout the state. In 1983, cases of adult and duckling mortality on Oʻahu were attributed to aspergillosis and salmonella (Engilis et al. 2002).

Occurrence of the Hawaiian Duck on Maui and at the Property. The Maui population of Hawaiian duck was estimated in 2004 at less than 20 birds, which occur primarily at Kanahā pond. This small breeding population is a result of a release of fewer than 12 captive individuals, which was conducted by the State of Hawaiʻi in 1989. Hybridization with feral mallards does occur on Maui and hybrids are likely to outnumber Hawaiian ducks (USWFS 2005a). No Hawaiian ducks were observed at the Property during any of the surveys.

3.8.4 Covered Species

3.8.4.1 Blackburn's Sphinx Moth

Population, Biology, and Distribution of Blackburn's Sphinx Moth. The Blackburn's sphinx moth is one of Hawaiʻi's largest insects with a wingspan of up to 12 cm. It is closely related to the North American tomato hornworm (*Manduca quinquemaculata*), with which it has been confused in the past. The two species differ substantially in biology and are geographically distinct. Riotte (1986) demonstrated that Blackburn's sphinx moth is a distinct species, native to the Hawaiian Islands, and these findings are accepted as valid to date. Relatively little research has been conducted on this species, thus there is a paucity of information on its biology, habitat associations, and population status. The Blackburn's sphinx moth is the first listed insect species in Hawaiʻi.

The Blackburn's sphinx moth is currently found in topographically diverse landscapes and in areas with low to very high levels of non-native vegetation. The primary constituent elements required by Blackburn's sphinx moth larvae for foraging, sheltering, and maturation are the two documented host plant species in the genus *Nothocestrum* (*N. latifolium* and *N. brevifolium*), both of which themselves are proposed or listed endangered species. At lower elevations the larvae are found most often on the non-native tree tobacco (*Nicotiana glauca*), but has also been found on commercial tobacco (*Nicotiana tobaccum*), eggplant (*Solanum melongena*), tomato (*Solanum lycopersicum* var. *cerasiforme*) (USFWS 2005), and the indigenous popolo (*Solanum americanum*). Primary constituent elements required by Blackburn's sphinx moth adults for foraging, sheltering, dispersal, breeding, and egg production that occur on the Property are native nectar-supplying plants mostly with a long, tubular calyx. Adult moths have been observed feeding on the native morning glory (*Ipomoea indica*) and halapepe (*Pleomele auwahiensis*), but they are expected to feed on a range of potential host plants that possess characteristics of adaptation to moth pollination, including a tubular calyx, light coloration, nocturnal anthesis (opening at night), or strong fragrance. Possible native adult host plants include maiapilo (*Capparis sandwichiana*), ʻilieʻe (*Plumbago zeylanica*), but non-native plants, including tree tobacco, may be used by adult moths for feeding (Rubinoff, UH, pers. comm.).

Minimum development time from egg to adult is reported as 56 days (Williams 1947), but VanGelder and Conant (1998) reported an average development time of 75.9 days based on data collected on moths reared in captivity. Information on adult longevity is not available, but sphingid moths generally have a longer lifespan than most moths, thanks to their ability to feed from a variety of sources, rather than relying on stored fat reserves. Captive moths in a study by VanGelder and Conant (1998) did not live longer than 12 days as an adult. They also did not observe adult moths feeding or attempting to feed on morning glory flowers, or artificial flowers. Despite this apparent lack of feeding these moths successfully reproduced. Larvae descend from their host plant or tree and search for suitable soil before pupating. They may remain dormant in the soil for up to one year (Rubinoff, UH, pers. comm.) as is common with congeneric species.

No estimates exist for Blackburn's sphinx moth population numbers, but the species is believed to have been in decline over the past 100 years (USFWS 2005). After an effort led by Bishop Museum staff to find the species in the late 1970s, it was considered extinct (Gagné and Howarth 1985),

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until 1984, when a population was discovered on Maui (Riotte 1986). The Blackburn's sphinx moth was once known from all of the Hawaiian Islands, but currently is restricted to Maui, Kahoʻolawe, and Hawaiʻi. The decline and disappearance from several islands has been attributed to habitat loss and fragmentation from urban and agricultural development, increased wildfire frequency, invasion by non-native invasive weeds, impacts from ungulate grazing, and direct impacts on the moth from non-native parasitoid flies and wasps, and insect predators.

Current Threats to Blackburn's Sphinx Moth. The Blackburn's sphinx moth recovery plan (USFWS 2005) cites a number of factors contributing to the species' continued decline. However, the magnitude and importance to limiting recovery of the species is unknown at this time. Dry and mesic forests are believed to play an important role in the moth's seasonal foraging and sheltering needs (USFWS 2005), and based on this assumption; the moth's range has declined approximately 82 percent since human arrival in the islands. The primary constituent elements required by Blackburn's sphinx moth larvae for foraging, sheltering, maturation, and dispersal include two documented host plant species in the genus *Nothocestrum* (*N. latifolium* and *N. brevifolium*) which are presently listed as endangered. Habitat loss and fragmentation exacerbates the impact of decreased nectar availability during drought, causing further threat to future viability of population (USFWS 2005).

Alien arthropods are believed to be a major threat to the Blackburn's sphinx moth through predation, parasitism, and direct competition. The main suspected predators include a number of ant (Formicidae) species which are known to impact other native arthropods, or are known predators of Lepidoptera elsewhere in their introduced range. Ants are not believed to be a native component of native Hawaiian fauna (Wilson 1996), and presently at least fifty species of invasive ants have become established in Hawaiʻi (Plentovich et al. 2010). Many ants are generalists, and can be particular destructive to native insular biota due to their high densities, recruitment behavior, and aggressiveness (Reimer 1993). The Blackburn's sphinx moth recovery plan (USFWS 2005) lists the following ant species as presenting a threat to the moth: *Pheidole megacephala*, *Iridomyrmex humilis, Anoplolepis gracilipes, Solenopsis geminata, S. papuana, and Ochetellus glaber*.

Parasites introduced either intentionally or accidentally, are believed to be a major factor limiting recruitment of the Blackburn's sphinx moth. Because of the relative rarity of the moth, the impact of parasitoids has not been quantified, but introduced parasitic braconid and ichneumonid wasps and tachinid flies have an abundance of hosts, and are considered a potentially major threat (USFWS 2005). A number of species of parasitic wasps in the Trichogrammatidae are established in Hawaiʻi, including and *Trichogramma* species were found to have parasitized 70% of eggs in a study by Williams (1947), and 8.8% of eggs in VanGelder and Conant's (1998) study. Although the impact of these wasps is most likely density dependent, the abundance of alternative hosts may enable extinction of the Blackburn's sphinx moth as part of the broader host base (Nafus 1993). Two parasitic tachinid flies (*Chaetogaedia* monticola, and *Lespesia archippivora*) have been purposefully introduced to control army worms. Both species are known to parasitize a variety of lepidopteran species, including sphinx moths, and both are known to occur on Maui and Hawaiʻi (Nishida 1997).

Occurrence of Blackburn's Sphinx Moth on Maui and at the Property. Neither *N. latifolium* nor *N. brevifolium*, which are considered to be a primary constituent element (PCE) required by Blackburn's sphinx moth larvae for foraging, sheltering, maturation, and dispersal, occurs on the Property or would likely survive if propagated on the Property, due to constraints related to rainfall and elevation.

Primary constituent elements required by Blackburn's sphinx moth adults for foraging, sheltering, dispersal, breeding, and egg production that occur on the Property are native nectar-supplying plants, including, morning glory (*Ipomoea* spp.), maiapilo (*Capparis sandwichiana*), and ʻilieʻe (*Plumbago zeylanica*). Another adult host plant may include halapepe (*Pleomele auwahiensis*) (USFWS 2005); however, this species is not found on the Property. The habitats that support these plants, i.e., dry and mesic habitats between the elevations of sea level and 1,525 m (5,000 ft) that receive between 25 and 250 cm (10 and 100 in) of annual precipitation, are also considered important elements in the recovery of the species by the USFWS (68 FR 111 34709-34766).

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Over 60 separate occurrences of moth sign (cut stems, chewed leaves, and frass) were found on tree tobacco within the kiawe-wiliwili shrubland habitat by Dr. David Preston of the Bishop Museum during surveys conducted in 2008 (Figure 3.5). However, Blackburn's sphinx moth densities were much lower than those of the non-native White-lined sphinx moth (*Hyles lineata*) and the non-native Oleander hawk moth (*Daphnis nerii*) found at Kanaio and Kahului by Van Gelder and Conant (1998).

VanGelder and Conant (1998) report Oleander hawk moth larvae on tree tobacco at Kanahā, Kahului, and White-lined sphinx moth larvae on tree tobacco at KNGTA lands. Vangelder and Conant (1998) report that Oleander hawk moth feeding damage 'appeared different' from that of Blackburn's sphinx moth, but they did not specify how to distinguish the two. Despite this reported difference in appearance, the report raises to question the technique of using leaf damage as an indication of Blackburn's sphinx moth activity, unless leaf damage can be distinguished. It also questions the identity of eggs found in areas where multiple species occur.

SWCA has photo documented Oleander hawk moth larvae on tree tobacco on Maui, Kim and Forest Starr (pers. comm.) have photo-documented *Agrius cingulata* feeding on tree tobacco, and Heather Eijzenga (PCSU, pers. comm.) has documented White-lined sphinx moth feeding on tree tobacco on ʻAleʻale off Kahoʻolawe. These non-native species are polyphagous. There are nine genera and twelve species of sphingid moths in Hawaiʻi. In addition, a multitude of additional organisms, including other lepidopterans, cause leaf and stem damage on tree tobacco, and using leaf and stem damage alone is an inaccurate assessment of Blackburn's sphinx moth activity. Dr. Daniel Rubinoff, Hawaiʻi's leading lepidopterist, insists that cut leaf stems and leaves cannot be used as a definitive sign of Blackburn's sphinx moth presence (Rubinoff, CTAHR UH, personal communication, Jan 26 and Apr 26, 2011). It should therefore not be presumed that the large number of 'signs' found at Honuaʻula are all attributable to Blackburn's sphinx moth. Three Blackburn's sphinx moth caterpillars were observed on tree tobacco over the period of study. SWCA has never observed any adult Blackburn's sphinx moth on the Property.

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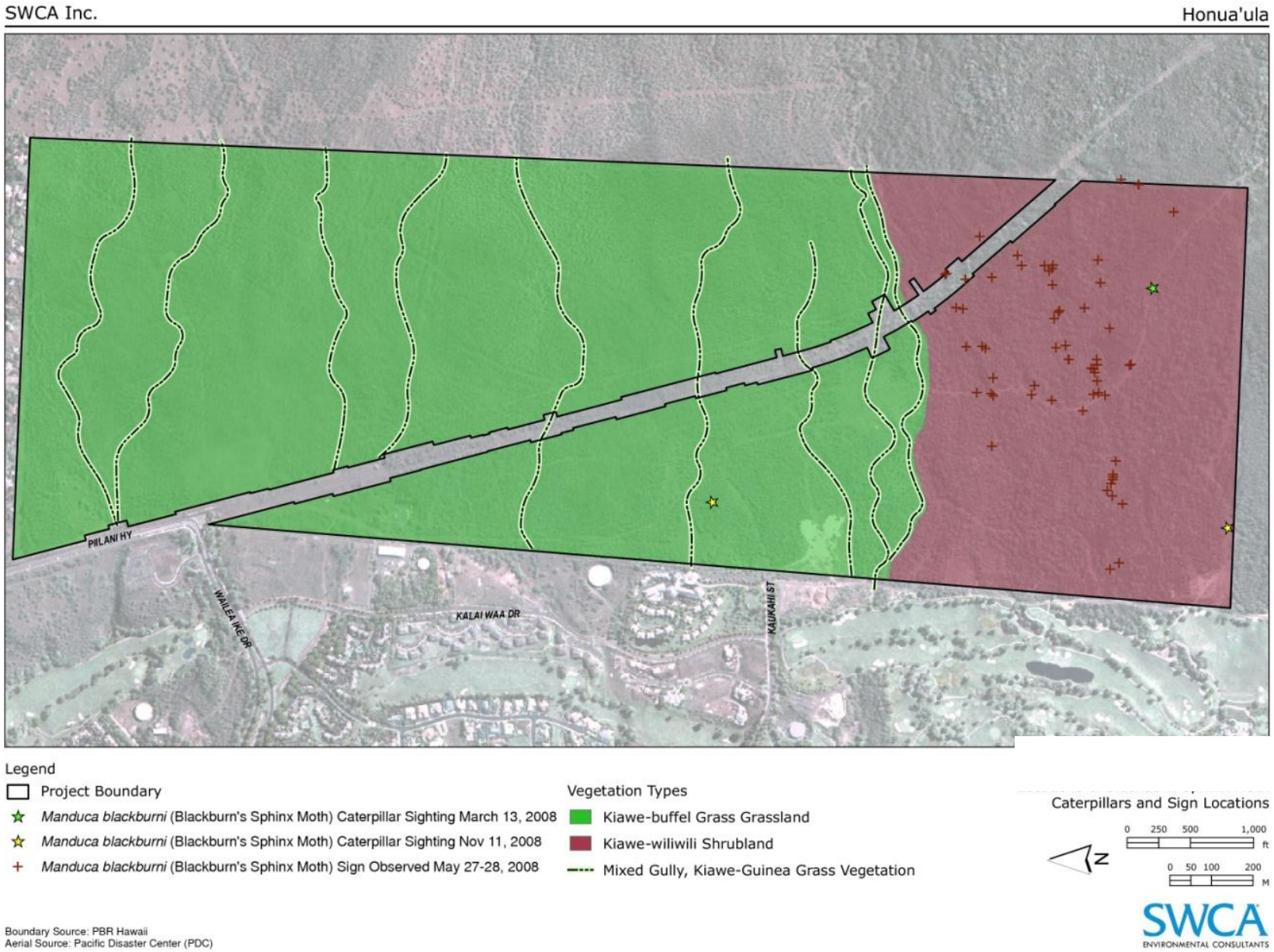
Figure 3.5: Locations of Blackburn's sphinx moth caterpillars and sign



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3.8.4.2 Nēnē

Population, Biology, and Distribution of Nēnē. The nēnē is a medium-sized goose with black head and nape contrasting a yellow-buff check and neck. Overall length is 63 to 69 cm (25-26 in) (HAS 2005). The nēnē is adapted to a terrestrial and largely non-migratory lifestyle in the Hawaiian Islands with negligible dependence on freshwater habitat. Compared to the related Canada goose (*Branta canadensis*), nēnē wings are reduced by about 16% in size and their flight capability is comparatively weak. Nonetheless, the nēnē is capable of both inter-island and high altitude flight (Miller 1937; Banko et al. 1999).

After nearly becoming extinct in the 1940s and 1950s, the nēnē population slowly has been rebuilt through captive-breeding programs. Wild populations of nēnē occur on Hawaiʻi, Maui, and Kauaʻi. The USFWS estimated that in the early part of the last decade, the nēnē population numbered 1,300 individuals (USFWS 2004a). The primary release site on Maui is located at Haleakalā National Park on East Maui where 511 nēnē were released between 1962 and 2003.

Since 1995, the majority of Maui releases have been from a release pen in the Hanaʻula region of West Maui in an effort to establish a second population on Maui on this part of the island (F. Duvall, Maui DOFAW, pers. comm.). Since 1994, 104 nēnē have been released at Hanaʻula, and 18 have been released at Haleakalā (USFWS 2004a). An effort to move approximately 300 nēnē off areas adjacent to airport runways on Kauai is underway, and as of May 2012 approximately 30 birds have been moved into pens at Haleakala Ranch.

The nēnē has an extended breeding season with eggs reported from all months except May, June and July, although the majority of birds in the wild nest during the rainy (winter) season between October and March (Banko et al. 1999, Kear and Berger 1980). Nēnē nest on the ground in a shallow scrape in the dense shade of a shrub or other vegetation. A clutch typically contains three to five eggs and incubation lasts for 29 to 31 days. The female incubates the eggs, with the male standing guard nearby, often from an elevated location. Once hatched, the young remain in the nest for one to two days (Banko et al. 1999). Fledging of captive birds occurs at 10 to 12 weeks, but may occur later in the wild. During molt, adults are flightless for a period of 4 to 6 weeks. Molt occurs after hatching of eggs, such that the adults generally attain their flight feathers at about the same time as their offspring. When flightless, goslings and adults are extremely vulnerable to predators such as dogs, cats, and mongoose. From June to September, family groups join others in post-breeding aggregations (flocks), often far from nesting areas.

Nēnē occupy various habitat types ranging from beach strand, shrubland and grassland to lava rock, at elevations ranging from coastal lowlands to alpine areas (Banko 1988; Banko et al. 1999). The geese eat plant material, and the composition of their diet depends largely on the vegetative composition of their surrounding habitats. They appear to be opportunistic in their choice of food plants as long as the plants meet their nutritional demands (Banko et al. 1999; Woog and Black 2001).

Current Threats to Nēnē. Current threats to nēnē include predation by non-native mammals, exposure in high-elevation habitats, insufficient nutritional resources for both breeding females and goslings, a lack of lowland habitat, human-caused disturbance and mortality (e.g., road mortality, disturbance by hikers), behavioral problems related to captive propagation, and inbreeding depression (USFWS, unpubl., USFWS 2004a). Predators of nēnē eggs and goslings include dogs, cats, rats and mongoose. Dogs and mongoose are also responsible for most of the known cases of adult predation (USFWS 2004a). Nēnē have also been negatively impacted by human recreational activities (e.g., hikers and hunters), and a number have been struck by vehicles. Nēnē may be attracted to golf courses, especially when water features are present, and become exposed to higher chances of interactions with humans. They may become subject to accidental strikes by golf balls, harassment, or even be intentionally killed. Adult birds, but especially chicks, are vulnerable to being struck by golf carts, trucks, and mowers (Medeiros, DOFAW; Swindle, USFWS pers. communication). In recent years, at least six nēnē have been inadvertently struck and killed by golf balls, and at least one has been intentionally killed on a golf course on Maui (USFWS 2004a, Medeiros, DOFAW pers. comm.).

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Starvation and dehydration can be major factors in gosling mortality. Approximately 81.5% of gosling mortality in Haleakalā National Park during the 1994 to 1995 breeding season was due to starvation and dehydration (USFWS 2004a). From 2005 – 2007, between 30 to 50% of the goslings at the Hakalau Forest Unit died due to drought and/or exposure (USFWS, unpubl. report). A lack of adequate food and water supplies also seems to be a limiting factor in Hawaiʻi Volcanoes National Park (USFWS 2004a).

For nēnē populations to survive they must be provided with generally predator-free breeding areas and sufficient food resources; human-caused disturbance and mortality must be minimized; and, genetic and behavioral diversity maximized. At the same time, it is recognized that nēnē are highly adaptable, successfully utilizing a gradient of habitats ranging from highly altered to completely natural, which bodes well for recovery of the species.

Occurrence of Nēnē on Maui and at the Property. The first captive nēnē to be reintroduced to Maui were 30 birds that were bred by the Wildfowl and Wetlands Trust in Slimbridge, England, and five birds from the Pohakuloa propagation project on Hawaiʻi. These birds were released in Haleakalā Crater at Haleakalā National Park on July 26, 1962 (Walker 1969). Besides Haleakalā, nēnē have been reported from Kahikinui, Kīhei, Kula, Lahaina, Olinda, Wailuku, and West Maui areas. The Maui population of nēnē in 2002 was estimated at 336 (USFWS 2004a). Nēnē were not observed during any of the surveys on the Property.

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4 BIOLOGICAL GOALS AND OBJECTIVES

The final addendum to the *Handbook for Habitat Conservation Planning and Incidental Take Permitting Process* (USFWS 2000) is a five-point policy guidance for the HCP process. The addendum outlines the importance of defining biological goals. These broad, guiding principles clarify the purpose and direction of an HCP's operating conservation program. Biological objectives are also integral to the HCP process to achieve the different components of the biological goals. The objectives are more measurable than the goals and may include: species or habitat indicator, location, action, quantity/state, and timeframe needed to meet the objective (USFWS 2000).

Honuaʻula Partners, LLC has met with local representatives of the USFWS and Hawaiʻi DLNR to discuss potential adverse impacts to the two Covered Species, measures to practicably avoid and minimize the potential for adverse impacts to all listed species, and biological goals and objectives. Where the potential for impacts is unavoidable, this HCP provides means to minimize and mitigate any adverse impacts to the listed species that may occur, and to provide a net conservation benefit.

Based on on-going surveys conducted in the project area, as well as records of species known to exist at adjacent areas, the proposed project is expected to directly or indirectly impact Blackburn's sphinx moth and nēnē, may attract Hawaiian stilt, Hawaiian coot, Hawaiian duck, Newell's shearwater, and Hawaiian petrel, and impacts to Hawaiian hoary bat and ʻāwikiwiki can be avoided.

<u>Specific biological goals of this HCP are to:</u>

1. Avoid impacts of construction activities on the Hawaiian hoary bat, ʻāwikiwiki, Newell's shearwater, Hawaiian petrel, and Blackburn's sphinx moth.
2. Avoid impacts of post-construction operations on Hawaiian stilt, Hawaiian coot, Hawaiian duck, Newell's shearwater, Hawaiian petrel, and ʻāwikiwiki.
3. Avoid and minimize, to the maximum extent practicable, impacts of post-construction operations on nēnē and Blackburn's sphinx moth.
4. Provide a net conservation benefit for the recovery of the Blackburn's sphinx moth and nēnē, pursuant to Chapter 195D, HRS.
5. Maintain the present population of ʻāwikiwiki on the property, and as much of the present population of nehe as practicable.

<u>Specific biological objectives accompanying these biological goals are:</u>

1.a. Develop and implement BMPs to prevent harm to Covered Species.
1.b. Provide endangered species awareness training to all construction personnel.
1.c. Deploy construction monitors to prevent harm to Covered Species.

2.a. Develop and implement BMPs for operations to prevent harm to Covered Species.
2.b. Provide endangered species awareness training to all employees.
2.c. Develop and implement a program to educate golfers about endangered species present on the golf course, and measures to avoid harm to Covered Species.
2.d. Develop and implement a program to avoid or minimize light-induced attraction of seabirds to the project site through selection and installation of appropriate lighting fixtures.

3.a. Adhere to goals of existing recovery plans for the species, considering the most recent updated information and goals.
3.b. Implement specific measures to manage and protect off-site habitat equivalent to the habitat destroyed by construction activities.

4.a. Develop and implement construction and operations BMPs to prevent harm to listed species.
4.b. Protect existing native plants on site from development and post-construction activities.

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5 ALTERNATIVES

5.1 No-Action ("No Build") Alternative

The "no-action" alternative would occur if the USFWS and DLNR fail to issue an ITP/ITL for the project. This would result in a "no build" alternative that would mean the Honuaʻula community would not be constructed, and the Property would remain vacant. There would be no master-planned community embracing "smart growth" principles, such as diverse residential opportunities, village mixed uses, onsite recreational amenities, and integrated bicycle and pedestrian networks. Honuaʻula Partners, LLC is a business entity created for this sole purpose; thus, a "no build" alternative is contrary to the Applicant's fundamental purpose and objective. Moreover, the vision for Project District 9 would not be realized, and decisions regarding the use of the Property for residential, recreational, and commercial uses previously made by the State LUC, the Maui Planning Commission, and the Maui County Council would not be implemented. In addition, under the no-build alternative, many of the conditions of zoning under County of Maui Ordinance No. 3554 that benefit the entire region would not be implemented. Likewise, the no-build alternative would deprive the State, County and general public of the significant economic benefits associated with Honuaʻula, and the range of mitigation measures proposed in this HCP for the protection and recovery of Covered Species would not be implemented. Lastly, the projected increasing demand for housing for a range of consumer groups in the Kīhei-Mākena region would remain unmet.

5.2 Alternative Preserve Layout

The initially evaluated site layout included a 22 acre native plant preserve along with 26 acres of native plant conservation area. During the evaluation process it was determined that much of the native plant conservation area was too fragmented and small or narrow to effectively protect the natural resources contained within. Effective preservation of 22 acres of onsite Blackburn's sphinx moth habitat was deemed to be difficult to manage and ineffective. For the native plants, the 22-acre area was not located or sized adequately to address an appropriate cross section of plants or density and was therefore enlarged to address this concern as well. In comparing the original 22 acre alternative with the proposed 40 acre proposal the owner has achieved a doubling of the preserve area without impacting the economic viability of the project.

Another alternative preserve layout was evaluated, but later deemed unacceptable. In this alternative, a master planned community would be constructed at the same location as the Proposed Action but with significant modifications to the size and location of the Single-family, Multi-family, Recreation and Open Space/Utilities Sub-Districts. The Native Plant Preservation Area within the Open Space Sub-District would be located on approximately 80 acres overlapping the preservation area described in the Proposed Action. This increase in acreage would shift a significant portion of both the single-family and multi-family housing density and acreage into the northern portion of the project, thereby increasing densities and modifying land use designations from single-family to multi-family in order to achieve the desired densities within the project. This shift in density and use would directly conflict with the conditions of approval and provisions contained within Maui County Code Section 19.90A (Project District 9 Zoning Ordinance) as well as off-site infrastructure improvements already designed to accommodate the location and densities approved within the conditions of approval and project district ordinance. In addition to causing the project to violate its project district zoning ordinance and its conditions of approval, this alternative would cause significant adverse economic impacts that would render the project infeasible.

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6 POTENTIAL IMPACTS

6.1 Estimating Project-Related Impacts

6.1.1 Blackburn's Sphinx Moth

Currently available scientific information regarding the population biology (e.g., distribution and abundance, density, population genetics) of Blackburn's sphinx moth on Maui is insufficient for use in calculating potential take at Honuaʻula. Furthermore, abundance of both host plants and individual moths varies on a temporal scale, complicating quantification of potential take. Direct take of adult moths, larvae, eggs, and pupae will be avoided following USFWS guidelines (Appendix 11), and requested take will be limited to permanent habitat loss for the Blackburn's sphinx moth. Therefore, in accordance with the Habitat Conservation Plan Handbook (Chapter 3, Sections B.2.b. and C.1), we employ a habitat-based approach to quantify take and to design on-site and off-site mitigation measures.

Vegetation across the 670 acre Property is not homogenous and is well delineated by three primary vegetation types: kiawe-buffelgrass (*Prosopis pallida-Cenchrus ciliaris*) grassland, intermittent drainage gulches and a kiawe-wiliwili shrubland (SWCA 2009a). The kiawe-wiliwili shrubland is delineated by the younger Hana Volcanic flow located in the southern 170 acre portion of the Property (Figures 3.3 and 6.1). Most plants believed to be native host species for adult Blackburn's sphinx moths including maiapilo (*Capparis sandwichiana*), morning glory (*Ipomoea spp.*), ʻiliʻeʻe (*Plumbago zeylanica*) are confined to this southernmost portion of the Property (Figure 3.4, table 6-1), and all evidence of Blackburn's sphinx moth larval presence and all but one larvae sightings occurred in this southern portion of the Property. Thus, we do not expect any take of individual moths or moth habitat to occur in the northern 497 acre portion of the property, which is characterized by kiawe-buffelgrass grassland.

To minimize project impacts to the Blackburn's sphinx moth and as part of the on-site mitigation (see section 7.3.1 for details) a perpetual conservation easement of 40 acres for a Native Plant Preservation Area will be preserved within the kiawe-wiliwili shrubland. No take of Blackburn's sphinx moth or moth habitat is expected to occur in this area. Therefore, we estimate the total take of Blackburn's sphinx moth habitat resulting from the construction of Honuaʻula to total 130 acres.

Tree tobacco and pōpolo (*Solanum americanum*) are the only confirmed larval host plants at the site and a very low number of scattered individual plants may be found in the northern portion of the Property. If any are found in the gulches or any other portion of the Property in which the existing vegetation is left intact, no impacts to Blackburn's sphinx moth larvae are anticipated. Any concerns for pesticide overspray in to areas with natural vegetation are addressed in the FEIS.

Although avoidance and minimization practices will be put into place as described in section 7.1.1.13, direct take of individual Blackburn's sphinx moth at the property may still occur during construction. In addition, because host plants will be maintained within the property, mainly the Native Plant Preservation Area, moths utilizing the property may be impacted by light attraction at the site post-construction. Based on USFWS recommendation to include direct take of Blackburn's sphinx moth, Honuaʻula Partners LLC requests the direct take of all moth larvae still occupying the soil within the project footprint during construction, despite avoidance measure implementation, in addition to up to one individual moth per year for the life of the permit.

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Table 6-1: A comparison of the number of native plants and seedlings observed within the entire Honuaʻula Property and the remnant mixed kiawe-wiliwili shrubland in the southern portion of the Property. Prop = entire Honuaʻula Property, KW = kiawe-wiliwili shrubland, NPPA = Native Plant Preservation Area. Adapted from SWCA (2009a).

Species (Hawaiian name)	**Number of Points**			**Number of Seedlings**			**Number of Adults**			**Total Numbers Observed**		
	KW	**Prop**	**NPPA**	**KW**	**Prop**	**NPPA**	**KW**	**Prop**	**NPPA**	**KW**	**Prop**	**NPPA**
Argemone glauca (pua kala)	26	26	4	247	247	119	165	165	58	412	412	177
Canavalia pubescens ('āwikiwiki)	5	5	5	0	0	0	5	5	5	5	5	5
Capparis sandwichiana (maiapilo)	311	312	91	14	14	0	548	549	168	562	563	168
Dodonea viscosa (ʻaʻaliʻi)	7	7	1	0	0	0	16	16	1	16	16	1
Doryopteris decipiens (ʻiwaʻiwa)	2	14	1	0	2	0	7	52	6	7	54	6
Erythrina sandwicensis (wiliwili)	546	569	127	334	341	64	2105	2137	554	2439	2478	618
Heteropogon contortus (pili)	0	66	0	0	384	0	0	1109	0	0	1493	0
Ipomoea tuboides (ipomea)	5	5	0	0	0	0	5	5	0	5	5	0
Lipochaeta rockii (nehe)	24	24	16	56	56	48	45	45	33	101	101	81
Myoporum sandwicense (naio)	17	17	8	0	0	0	21	21	11	21	21	11
Senna gaudichaudii (kolomona)	28	32	4	1	5	0	36	38	4	37	43	4
Sicyos hispidus (ʻānunu)	48	49	13	5	5	0	107	108	41	112	113	41
Sicyos pachycarpus (ʻānunu)	101	102	13	313	313	199	289	290	43	602	603	242

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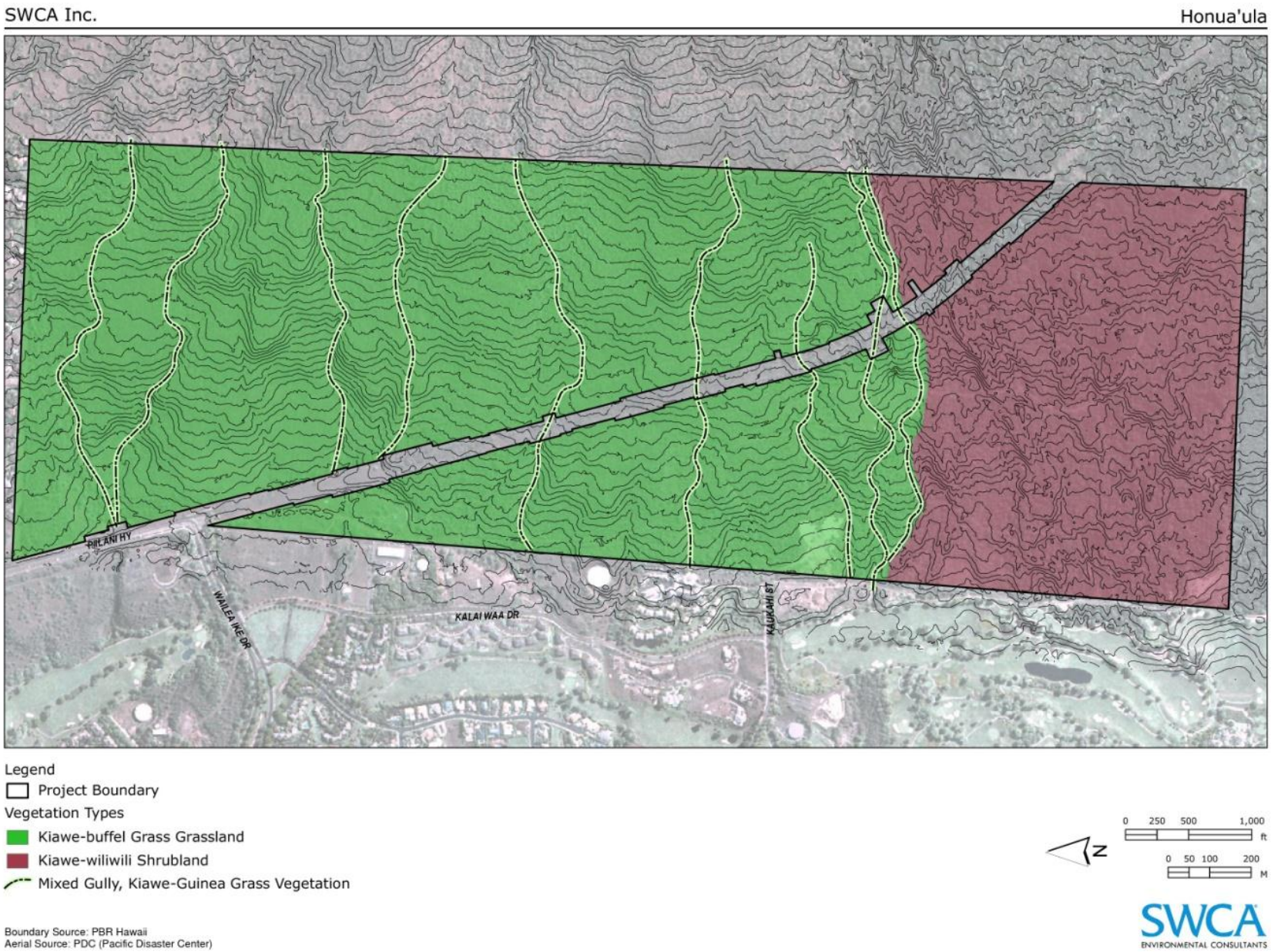
Figure 6.1: Vegetation types within the property



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6.1.2 Nēnē Direct Take

Nēnē are currently not found at or near the Property (SWCA 2009b) and the nearest populations occur at Haleakalā National Park, and West Maui (USFWS 2005). There have been nēnē sightings in Kīhei, Maʻalaea, and ʻUlupalakua, and the Property's location in between these sites puts it within a hypothetical flight path between these sites. Construction activities are not expected to attract nēnē to the Property, and therefore no direct take is anticipated for this species during the construction phase.

The creation of golf greens and lawns on the Property may conceivably attract nēnē. A variety of human activities may lead to direct take of nēnē, including disturbance caused by hikers, hunters, and other outdoor recreational activities, and harm caused by vehicles, and golf balls (USFWS 2005, Swindle, USFWS pers. comm.). There is anecdotal information about incidents involving injury to or death of nēnē on golf courses, but there is no quantitative data on which to base a take estimate. In addition, incidents resulting in disturbance or take of nēnē are not always documented or reported, and cause of mortality is often undetermined (Medeiros, DOFAW per. comm.). Golf balls struck nēnē on at least six occasions between 1992 and 1994 at Volcano Golf Course and Country Club, Hawaiʻi. Five birds died as a result and a sixth one died as a result of predation as it lingered overnight with its stricken mate (Banko et al. 1999). This golf course is located within close proximity of a core population of nēnē at Hawaiʻi Volcanoes National Park. In addition there is one report of nēnē intentionally killed by golfers on Maui in 1997.

Agency biologists estimate that approximately 1-3 incidents occur per year across the 50 golf courses on the islands of Kauaʻi, Maui, and Hawaiʻi (Swindle USFWS, Creps DOFAW, Polhemus formerly DOFAW, pers. comm.), but Maui nēnē biologist for DOFAW on Maui, John Medeiros, estimates that the number of incidents resulting in take on the 14 golf courses on Maui averages between 1-3 per year, fluctuating greatly between years. Currently, there are no reports of nēnē in the Mākena-Wailea area (Medeiros, DOFAW pers. comm.), indicating a low likelihood of nēnē becoming attracted to or even established on the Property. However, Haleakalā Ranch, in cooperation with USWFS and DOFAW, is constructing a release pen southeast of Manawainui gulch at 2,625 feet elevation in the Waiopae area, at which nēnē will be released in the near future (Haleakalā Ranch, USFWS, DLNR, 2009). This is expected to increase the nēnē population on Maui and locally, and will bring nēnē closer to the relative vicinity of the Property, and increase the likelihood of nēnē sightings at or in the vicinity of the Property. How much this likelihood will increase is unknown. Although in general females remain near their natal sites, while males disperse, reasons for fluctuations in dispersal are relatively unstudied.

In addition, released females are less philopatric than wild ones (Woog 2000). Nēnē are most vulnerable to take during nesting activities. Eggs and chicks can be struck by trucks, golf carts, and mowers, or nest failure can occur as a result of predation. Adults are more aggressive when breeding, which leads to increased interaction with humans around the breeding site. Measures will be implemented to avoid nesting on the Property (see Section 7.1.11), but if the nēnē population increases in the vicinity of the Property, nesting may not be entirely avoidable in the future. Nēnē are generalist feeders, and are known to feed on a variety of native and non-native berries, sedges and grasses, and are attracted to mowed turf. They will nest under a variety of shrubs, including, but not limited to the native pūkiawe (*Leptecophylla tameiameiae*), aʻaliʻi (*Dodonaea viscosa*), ʻōhelo (*Vaccinium reticulatum*), and non-native christmasberry (*Schinus terebinthifolius*), lantana (*Lantana camara*), and ironwood (*Casuarina equisetifolia*) (Banko et al. 1999). Currently, nēnē nest on 2-3 of Maui's 14 golf courses every year (Medeiros, DOFAW pers. comm.).

For direct take estimate, based on information and assumptions presented above, we estimate an incident rate of 0.25 nēnē/year/golf course, or 1 nēnē every 4 years. The Property is not currently located in close proximity to existing nēnē habitat, the golf course will not contain water features, and extensive golf course operation minimization and avoidance measures will be implemented. Nevertheless, we assume an incidental take risk of 0.25 nēnē take occurrences per year.

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6.1.3 Nēnē Indirect Take

Honuaʻula will implement management strategies aimed at preventing the creation of an attractive nuisance, in particular conditions favorable for nēnē nesting. Therefore, nēnē are most likely to visit the golf greens at the Property during non-breeding periods (May through July) or at the end of their breeding period when the adults and young may travel as family groups. Nēnē are highly territorial during the breeding season (Banko et al. 1999) and males are likely to be defending nesting territories while the females are incubating. Upon hatching, both parents attend to heavily dependent young; adult nēnē also molt while in the latter part of their breeding period and are therefore flightless for four to six weeks (USFWS 2004a). These adults attain their flight feathers at about the same time as their goslings (USFWS 2004a). Consequently, such birds are more likely to visit the property only when goslings have already fledged.

Indirect take to account for loss of dependent young will be assessed for adult nēnē only when mortality occurs during the breeding season (August to April). Adults found during the months of October through March will be assumed to have had a 60% chance of having been actively breeding because 60% of the population has been recorded to breed in any given year (Banko et al. 1999). Adult nēnē mortality that occurs outside the peak breeding season (April, August and September) will be assumed to have had a 25% chance of breeding. Male and female nēnē care for their young fairly equally, so indirect take is assessed equally to the direct take of any male or female adult nēnē found during the breeding season. Because breeding nēnē are not expected to visit the Property prior to the fledging of their young, we base the number of young possibly affected by loss of an adult on the average number of fledglings produced per pair (studies indicate that average number of fledglings produced annually per pair of nēnē is 0.3 (Hu 1998)).

Based on these assumptions, as indicated in Table 6.2 below, the amount of indirect take assessed for each direct take of an adult nēnē during the months of October through March is 0.09. Amount of indirect take assessed for each direct take of an adult bird during the remainder of the breeding season is 0.04.

Table 6-2: Calculation of indirect take of nēnē.

Nēnē	Season	No. fledglings per pair (A)	Likelihood of breeding (B)	Parental contribution (C)	Indirect (A*B*C)
Adult, any gender	Oct-Mar	0.3	0.60	0.5	0.09
Adult, any gender	April, Aug and Sep	0.3	0.25	0.5	0.04
Adult, any gender	May–July	--	0.00	--	0.00
Immature	All year	--	0.00	--	0.00

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6.1.4 Estimated Total Take for Nēnē

Direct take estimates based on current and future projections of nēnē mortality on golf courses is low. In addition, the actual number of incidents per year fluctuates significantly (Medeiros, DOFAW pers. comm.). To account for the stochasticity of take over time, where take in any given year take may be higher or lower than the expected long-term average, this HCP includes a 30-year project term take limit, as well as a one-year take limit (e.g., take could be authorized as three individuals in any given year but not more than five individuals total for the project duration). The total project-life take limit is a better reflection of the long-term amount of take expected, while the one-year short term take limit reflects the maximum expected take for any given year.

Nēnē are not expected to be attracted to the golf greens every year, particularly in their current population status and distribution. However, the population of nēnē on Maui is expected to expand, which may increase the likelihood of the species occurring at Honua'ula. Therefore incidental take of nēnē is estimated over 15 years, rather than the full 30-year project life span.

The estimated direct take incidental to golf course operations is 3.75 birds. Indirect take associated with these nēnē is 0.3 (0.09 per take), thus the total estimated take is 4.05 nēnē. Requested and expected take is summarized below in table 6-3.

Table 6-3: Expected take, and requested take: 1-year limit, and 15-year project life limit.

Tier		***Direct***	***Indirect***	***Total***
Expected take	Annual average	0.25	0.02	0.27
	Project life	3.75	0.3	4.05
Requested take	1-year limit	1 (0.25)	1 (0.02)	2 (0.27)
	Project life limit	4	1	5

The current population of nēnē statewide is estimated at 1,300 individuals with 315 birds occurring on Maui (DOFAW unpubl. data 2003). The rates of take estimated for nēnē are not expected to significantly affect the species. Avoidance and minimization measures will most likely altogether prevent any take of nēnē that may incidentally visit the Property. The proposed mitigation measures will therefore contribute to the species' recovery in absence of take, or provide a net conservation benefit in case of incidental take. For this reason, no significant adverse impacts to the species' overall populations, and no significant cumulative impacts to the species, are anticipated.

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6.2 Cumulative Impacts to Listed Species

Presently only one incidental take permit has been issued for Blackburn's sphinx moth. Auwahi Wind Farm has obtained a 25-year permit under section 10(a)(1)(B) and HRS 195D for the permanent take of 0.3 acres of degraded habitat with some native species, and an additional 27.7 acres of degraded habitat (Tetra Tech EC, Inc 2012).

Two ESA Section 10(a)(1)(B) permits for nēnē have been issued through an HCP on the Island of Maui (Table 6-4), and one additional permit is pending approval. Take has also been authorized through two Safe Harbor Agreements (SHAs) on Maui (Table 6-4). Under a Safe Harbor Agreement, property owners voluntarily undertake management activities on their property to enhance, restore, or maintain habitat benefiting species listed under the ESA. These agreements assure property owners they will not be subjected to increased property use restrictions if their efforts attract listed species to their property or increase the numbers or distribution of listed species already on their property. The USFWS issues the Applicant a permit which authorizes any necessary future incidental take through Section 10(a)(1)(A) of the ESA. Accordingly, all impacts associated with these Section 10 permits have been mitigated.

Authorized take of nēnē is documented at several locations on Maui (Table 6.4). Since 2006, KWP LLC has documented observed direct take of four full-grown nēnē (Kaheawa Wind Power 2008, 2009.). Since 2005, two nēnē fatalities have been documented at Piʻiholo Ranch, while 48 nēnē have been released at Piʻiholo Ranch (DOFAW 2008). Other developments on Maui with the potential to have cumulative impacts to nēnē include developments that decrease nesting and foraging habitat, as well as golf courses which may attract nēnē to the area, increasing their vulnerability to vehicular collisions or golf ball strikes (USFWS 2005).

Proposed mitigation measures for nēnē at Honuaʻula are expected to more than offset the anticipated take and will contribute to the species' recovery by providing a net conservation benefit, as required by State law. Similar measures are expected for other developments on Maui with the potential to impact nēnē. For this reason, the cumulative impact of take authorized for Honuaʻula combined with previously and future authorized take is not expected to result in a significant cumulative impact to the species.

At a broader scale, Honuaʻula represents one of many development projects that may be expected to occur on the Island of Maui. Some of the causes of decline of the Covered Species, including habitat reduction and fragmentation, may be on the rise due to continued real estate development on Maui, and will likely continue increasing in the future. Even when conducted in compliance with all applicable local, state and federal environmental regulations, there is the potential for cumulative impacts to occur from these projects because many do not trigger review under endangered species provisions and thus are not required to meet the "net environmental benefit" standard. By implementing this HCP, Honuaʻula will ensure that the net effects of this project will contribute to the recovery of the Covered Species, and thus not contribute to cumulative impacts that may occur as a result of these other developments. Currently, the areas of dry to mesic scrub and forest habitats below 5,000 feet (1,525 m) that are, or could potentially be used by the Blackburn's sphinx moth consist of approximately 367,161 acres (148,588 ha) (USFWS 2005). The 130 acres expected to be lost as a result of development of Honuaʻula, represents 0.03% of the presently available or occupied habitat.

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Table 6-4: Habitat Conservation Plans and Safe Harbor Agreements for Nēnē.

Permittee	Permit Duration	Location	Species Covered	No. of Permitted Take Over Permit Duration
Habitat Conservation Plan Permits				
Kaheawa Pastures Wind Energy Facility	01/30/2006-01/30/2026	Māʻalaea, Maui	Hawaiian goose	60
Kaheawa Wind Power II	01/04/2012-01/04/2032	Māʻalaea, Maui	Hawaiian goose	30
Auwahi Wind Farm	01/31/2012-01/31/2037	Auwahi, Maui	Hawaiian goose	5
Safe Harbor Agreement Permits				
Molokai Programmatic SHA for Nēnē	04/07/2003-04/07/2053	Island Wide Molokaʻi	Hawaiian goose	Various
Puu O Hoku Ranch – Nēnē Reintroduction	08/22/2001-08/22/2008	Cape Halawa Molokaʻi	Hawaiian goose	>0
Umikoa Ranch	12/05/2001-12/05/2051	Umikoa Ranch, Hawaiʻi	Hawaiian goose	>0
Participants of USDA Farm Bill Conservation Programs	09/12/2007-09/12/2017	Statewide	Hawaiian goose	Various
Piʻiholo Ranch	09/21/2004-09/21/2054	Makawao, Maui	Hawaiian goose	>0

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6.3 Assessment of Impact on Critical Habitat

The project site does not currently contain critical habitat for any listed species. However, on June 11th, 2012 USFWS published a proposed rule to list 38 species on Molokai, Lanai, and Maui as endangered and to designate critical habitat for 135 species on Molokai, Lanai, Maui, and Kahoolawe, under the Endangered Species Act of 1973, as amended (77 FR 34464-34775). In addition to designating critical habitat for those species that are proposed for listing as "endangered" under this rule, USFWS also proposes to designate critical habitat for 11 additional species that are already listed, but do not yet have designated critical habitat. Further, USFWS is proposing to revise critical habitat for 85 species that are already listed as threatened or endangered on the four aforementioned Hawaiian Islands. USFWS uses an ecosystem-based approach to the proposed designation and/or revision of critical habitat under this proposed rule in an effort to conserve habitat units that the USFWS has determined to be essential to the conservation of multiple species. The proposed critical habitat includes areas currently occupied by listed species, and areas that are currently unoccupied, as well as areas for which no previous records exist.

The proposed critical habitat designation totals 271,062 acres on Molokai, Lanai, Kahoolawe, and Maui. Forty-seven (47) percent of the area being proposed as critical habitat on those islands is currently already designated as critical habitat. In effect, the proposed rule would result in more than doubling the area of critical habitat currently designated on Maui, and would cover approximately 40% of the land area on the island, 45% of which is privately owned.

Part of the proposed Maui-Lowland-Dry Unit 3, which totals 1,098 acres, is located within the Honua'ula Property. Almost all of the land in proposed Maui-Lowland-Dry Unit 3 that is not part of the project area is land owned by Ulupalakua Ranch, and is being considered for exclusion from critical habitat by USFWS. Maui-Lowland-Dry Unit 3 is proposed designated critical habitat for 19 species: *Alectryon micrococcus, Bidens micrantha* ssp. *kalealaha, Bonamia menziesii*, *Canavalia pubescens, Cenchrus agrimonioides, Colubrina oppositifolia, Ctenitis squamigera, Flueggea neowawraea, Hibiscus brackenridgei, Melanthera kamolensis, Melicope adscendens, Melicope mucronulata, Neraudia sericea, Nototrichium humile, Santalum haleakalae* var. *lanaiense, Sesbania tomentosa, Solanum incompletum, Spermolepis hawaiiensis,* and *Zanthoxylum hawaiiense*. Of these 19 species, only *Canavalia pubescens* ('āwikiwiki) (Sect. 3.7.1.1) has been recorded at the project site (Char and Linney 1988; Char 1993, 2004; SWCA 2006, 2009a; Altenberg 2007).

Through the proposed mitigation plan, this HCP will implement measures that benefit some of the 19 listed species with proposed designated critical habitat in Lowland Dry Unit 3. The offsite mitigation areas selected for this plan offer high potential for contribution to recovery due to the presence of primary constituent elements (PCEs) for most of the 19 species. The relative paucity of PCEs for most of the species for which critical habitat is proposed at the Honua'ula project site, combined with the absence of 18 of the 19 species for which Unit 3 is proposed significantly limits the potential contribution of the Honua'ula project site to the recovery of these species in the long term.

As stated in 50 C.F.R. 424.12(b), PCEs are to be determined for each species when designating critical habitat. The proposed rule uses an ecosystem-based approach to determining PCEs, and contains for each critical habitat unit "physical or biological features essential to the conservation of those individual species that occupy that particular unit, or areas essential for the conservation of those species identified that do not presently occupy that particular unit" (FR 77 (112) 34473). These physical and biological features present in the ecosystems are considered to provide the necessary PCEs for each species in the proposed rule (FR 77 (112) 34527). For the 19 species in Lowland Dry Unit 3, these physical and biological features include an elevation range of less than 3,300 ft, annual precipitation of less than 50 in, and substrates including weathered silty loams to stony clay, rocky ledges, and little-weathered lava. These general features are found in most of the southern and western flanks of Haleakala below 3,300 ft and southern and western west Maui. The physical and biological features pertaining to Unit 3 also include canopy species: *Diospyros, Myoporum, Pleomele, Santalum,* and *Sapindus; s*ubcanopy species: *Chamaesyce, Dodonaea, Leptecophylla, Osteomeles, Psydrax, Scaevola,* and *Wikstroemia;* and understory species: *Alyxia, Artemisia, Bidens, Chenopodium, Nephrolepis, Peperomia,* and *Sicyos.* Although these are

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generally not uncommon Hawaiian species or genera, only one of the canopy species (*Myoporum*), one of the subcanopy species (*Dodonaea*), and one of the understory species (*Sicyos*) in the list of PCEs are found at the project site. None of these species are particularly common at the project site, or can be considered to be representative of the features or vegetation of the project site. In 2006-2007, SWCA found 16 aʻaliʻi (*Dodonaea viscosa*) in seven locations, 21 naio (*Myoporum sandwichense*) in 17 locations, and 113 ʻānunu (*Sycios hispidus*) at 49 locations (SWCA 2009a).

The proposed project will result in a net conservation benefit to the one species with occupied habitat at the project site, ʻāwikiwiki. As described in section 3.7.1.1, only five individuals have been found within the project area, and all of these plants will be protected within the proposed Native Plant Preservation Area (sect. 7.3.1). This 40 acre Native Plant Preservation area will be managed to remove threats to the species, improve habitat conditions, and the population of the species itself will be enhanced through propagation and outplanting. Under the proposed mitigation plan, an additional population of ʻāwikiwiki will be established at the Kanaio offsite mitigation area (sect. 7.4.1.1). Under current conditions, the few ʻāwikiwiki plants at Honuaʻula are under threat from ungulates, competition from invasive species, and fire, making local recovery potential for the species very low without the measures proposed in this HCP.

Likewise, the proposed critical habitat for ʻāwikiwiki and the additional 18 species not occupying the area will receive more conservation benefit from the proposed onsite and offsite mitigation program (sect. 7.3.1 and 7.4.1) than it would in absence of the project. The loss of approximately 119 acres of this proposed critical habitat will be offset by protection and enhancement, in perpetuity, of 40 acres onsite, and an additional 354 acres offsite on lands owned by Ulupalakua Ranch (fig.7.1). As noted in this HCP, the onsite mitigation involves a perpetual onsite conservation easement, weed control including manual, chemical, and mechanical removal; control of pest animal species, including rats; enhancement of native plant species through propagation and outplanting; exclusion of ungulates; interpretive trail and informational signs. For the offsite mitigation component of the plan, perpetual conservation easements and preservation will be implemented in currently unprotected, privately owned lands in Kanaio, in an area that is widely acknowledge to harbor significant populations of Blackburn's sphinx moth and its native host plants on Maui. In addition, the HCP includes perpetual preservation and restoration of an area within the Auwahi Forest Restoration Project, a currently partially protected, privately owned area that is part of what was once described as one of the richest botanical regions in Hawaiʻi. The offsite mitigation plan involves perpetual conservation easements, exclusion and eradication of ungulates, weed control using chemical, manual, and mechanical removal, and enhancement of native plant species though propagation and outplanting. The mitigation plan will provide for 15 years of funding for habitat improvements, followed by ongoing, perpetual, funding for maintenance of the mitigation sites. Of the total 394 acre mitigation area, 204 acres are situated within proposed Lowland Dry critical habitat. Honuaʻula partners LLC will provide an additional $125,000 to contribute to a fencing project on land identified within proposed Lowland Dry critical habitat (USFWS 2012), with the approval of DOFAW and FWS, as well as fence maintenance and repair through the permit period. At minimum, this will benefit an additional 35 acres of proposed Lowland Dry critical habitat. The impacts to approximately 119 acres of proposed Lowland Dry critical habitat will be offset at a 2:1 ratio, as recommended by USFWS (Dawn Greenlee, pers. comm.) through mitigation on 239 acres on proposed Lowland Dry critical habitat.

The onsite mitigation area falls within the proposed Lowland Dry Unit 3, and the offsite mitigation areas fall within Lowland Dry Unit 1, Montane Dry Unit 1, and Montane Mesic Unit 1. These units include occupied habitat for *Alectryon macrococcus, Bonamia menziesii, Cenchrus agrimonioides, Flueggea neowawraea, Melanthera kamolensis, Melicope adscendens, M. knudsenii, Santalum haleakalae* var. *lanaiense, Sesbania tomentosa, Spermolepis hawaiiensis, Zanthoxylum hawaiiense, Argyroxiphium sandwicense* ssp. *macrocephalum, Asplenium dielerectum, A. peruvianum* var. *insulare, Bidens campylotheca* ssp. *pentamera, Clermontia lindseyana, Cyanea horrida, C. mceldowneyi, C. obtusa, Cyrtandra ferripilosa, C. oxybapha, Diplazium molokaiense, Geranium arboreum, G. multiflorum, Huperzia mannii,* and *Neraudia sericea*; and for two forest birds, the akohekohe (*Palmeria dolei*) and kiwikiu (*Pseudonestor xanthophrys*). These units provide additional unoccupied habitat for *Bidens micrantha* ssp. *kalealaha, Canavalia pubescens, Colubrina oppositifolia, Ctenitis squamigera, Geranium arboreum, Hibiscus brackenridgei, Melicope mucronulata, Neraudia sericea, Nototrichium humile, Solanum incompletum, Alectryon*

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macrococcus, Cyanea glabra, C. hamatiflora ssp. *hamatiflora, C. kunthiana, Phyllostegia bracteata, P. mannii, Wikstroemia villosa,* and *Zanthoxylum hawaiiense.* All of the 19 species included in the Lowland Dry Unit 3 are represented in the offsite mitigation areas, and 11 of those have occupied habitat in the proposed critical habitat units within which the proposed offsite mitigation areas are located. Thus, the proposed mitigation plan will improve and conserve occupied as well as unoccupied habitat for all of the 19 affected species. To further benefit species for which Lowland Dry Unit 3 is proposed, a number of these species will be included in the outplanting effort at the offsite mitigation areas, where appropriate. In addition to āwikiwiki, outplantings will include *Bidens micrantha* ssp. *kalealaha, Bonamia menziesii, Cenchrus agrimonioides, Colubrina oppositifolia, Hibiscus brackenridgei, Neraudia sericea, Sesbania tomentosa, Solanum incompletum,* and *Spermolepis hawaiiensis,* to enhance or establish populations of these species at the mitigation sites. Based on biological restrictions, *Ctenitis squamigera, Melanthera kamolensis, Melicope mucronulat.* and *Nototrichium humile* are not appropriate for planting in these areas, and will not be included in the outplantings. The mitigation areas do not provide habitat to support successful protection and conservation of *Flueggea neowawraea, Alectryon macrococcus, Melicope adscendens, Zanthoxylum hawaiiense,* and *Santalum haleakalae* var. *lanaiense*; therefore, these species are also not included in the outplantings at the offsite mitigation areas.

As noted in the proposed rule, the Secretary may exclude an area from critical habitat based on economic impacts, impacts to national security, or any other relevant impacts. The Secretary can consider the existence of conservation agreements, other land management plans and voluntary partnerships with Federal, private, State, and tribal entities when making decisions under Section 4(b)(2) of the ESA. When considering the benefits of exclusion, USFWS considers factors such as whether exclusion of a specific area is likely to result in conservation; the continuation, strengthening, or encouragement of partnerships; or the implementation of a management plan that provides equal to or more conservation than a critical habitat designation would provide. In evaluating the existence of a conservation plan when considering the benefits of exclusion, USFWS considers a variety of factors including, but not limited to, whether the plan is finalized; how it provides for the conservation of the essential physical or biological features; whether there is a reasonable expectation that the conservation management strategies and actions contained in a management plan are likely to be implemented into the future; whether the conservation strategies in the plan are likely to be effective; and whether the plan contains a monitoring program or adaptive management to ensure that the conservation measures are effective and can be adapted in the future in response to new information.

The propsed rule includes a number of areas considered for exclusion from critical habitat designation on the basis of existing voluntary conservation agreements and management plans, including a HCP, to benefit conservation of the affected species and their habitat. Given the benefits of the conservation measures and mitigation plan proposed in this HCP, and the limited resources for most of the 19 species at the Honaua'ula project site, as defined in the proposed rule, the area covered by the HCP may be considered for exclusion.

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7 AVOIDANCE AND MINIMIZATION, AND MITIGATION MEASURES

7.1 General Avoidance and Minimization Measures

The analysis of project design alternatives supports the conclusion that the Proposed Action is preferred after consideration of financial feasibility and all impacts on the human and natural environment. Complete avoidance of risk to the Covered Species is impossible under the Proposed Action. Therefore, Honuaʻula Partners, LLC has incorporated a number of measures to avoid and minimize the risk of impacts on Covered Species. Additional measures are included to avoid and minimize risks to other wildlife species that may otherwise be adversely impacted by the project, to minimize impacts on the human environment, and to avoid any impacts to species included in this HCP, but for which take is not requested. General measures apply to both construction and post-construction activities, and additional measures for activities associated with construction and post-construction operations are specified. These measures include, but are not limited to:

7.1.1 Natural Resources Manager

A Natural Resources Manager will be hired as recommended in the Honuaʻula Conservation and Stewardship plan (SWCA 2010a). DOFAW and USFWS may approve the criteria and qualifications for the position, but Honuaʻula Partners, LLC will hire the Natural Resources Manager. Performance of this person will be evaluated against the approved HCP. The Natural Resources Manager's responsibilities will include, but are not limited to: conducting public outreach, supporting plant restoration and propagation efforts, conduct scientific research, controlling and eradicating invasive species from plant preservation and conservation areas, and implementing the goals and objectives of the Honua'ula Conservation and Stewardship Plan. The appointed person will also oversee implementation of other avoidance and minimization measures described in this section during construction and post-construction operations. The Natural Resources Manager will work cooperatively with government and non-governmental organizations including the Maui Invasive Species Committee (MISC), Leeward Haleakalā Watershed Alliance, DLNR, and other organizations.

The Natural Resources Manager will be hired at the start of Phase I of the project, before any major construction activities commence, and will be responsible for designing and implementing any necessary protocols to avoid and minimize impacts to any of the Covered Species. This position will remain filled for the life of the project.

The responsibilities of the Natural Resources Manager as specified in this HCP include:

- Coordinate response to injured or deceased wildlife at the Property (Sect 7.1.2).
- Conduct surveys before, during, and after construction for Blackburn's sphinx moth, Hawaiian short-eared owls, and Hawaiian hoary bat (Sect 7.1.4, Sect 7.1.12, and Sect 7.1.13).
- Keep track of presence and activity of Covered Species at the Property (Sect 7.1.9).
- Ensure golf course Marshalls and Starters receive training in identification of Covered Species, and in measures to avoid and minimize harm to these Covered Species (Sect 7.1.11).
- Implement a program to translocate scattered, rarer, native plants occurring outside of the Native Plant Preservation Area or Plant Conservation Areas to appropriate areas within the boundaries of these protected areas. Additional details may be provided for in the Landscape Plan (Sect 7.3.1).
- Develop a fire plan in consultation with USFWS, DLNR, and other entities as appropriate (Sect 7.3.3).
- Implement a monitoring program in consultation with USFWS, DLNR, and other entities as appropriate (Sect 7.3.3).
- Develop a public education and outreach program (Sect 7.3.3). This will consist of a golf course component, to be completed prior to start of golf course operation, a general local community and general public at large component, and an endangered species awareness component (Sect. 7.1.2). The general education and outreach component will include sponsoring service trips to assist with management activities, field trips for island students, and development of interpretive signs to encourage public cooperation and discourage trespassing through the Native Plant Preservation Area.

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- Ensure succession of management of the on-site and off-site mitigation areas, should the assigned manager or organization cease to exist or otherwise become unavailable to manage and execute the mitigation measures.

7.1.2 Endangered Species Education Program

An endangered species education program will be conducted for all regular on-site staff. The program will be long-term, on-going, and updated as necessary. Staff will be trained to identify listed and non-listed native wildlife species that may be found on-site, to record observations of species protected by the ESA, HRS 195, and/or MBTA, and to take appropriate steps when and if injured or deceased wildlife is found (see Appendix 7).

As part of their safety training, temporary employees, contractors, and any others that may drive project roads will be educated as to project road speed limits, the possible presence of injured or deceased wildlife on roads, and the possibility of nēnē and Hawaiian short-eared owls on roads. These types of personnel will be instructed to contact the Natural Resources Manager immediately if they detect any injured or deceased wildlife on-site.

Construction Phase Avoidance and Minimization Measures

7.1.3 Endangered Species Construction Contract Provisions (Including BMPs)

Honuaʻula Partners, LLC will develop provisions and restrictions, which may be based on the Best Management Practices described in the HCP, to avoid and minimize impacts to Covered Species. These provisions and restrictions will apply to all construction activities planned for areas in which Covered Species may occur. These provisions will be inserted into construction contracts for these activities.

7.1.4 Pre-Construction Wildlife Surveys

The Natural Resources Manager will conduct surveys of any areas that will be subject to large-scale construction activities, such as mass-grading. The main focus of these surveys will be on Blackburn's sphinx moths and Hawaiian Short-eared owls. Surveys will be of sufficient scope and duration to detect these species, and survey protocols will be review by the agencies prior to any ground-breaking activities.

Potential larval host plants for the Blackburn's sphinx moth, including tree tobacco and other plants in the Solanaceae family, will carefully be examined before removal. If sign or larvae are found, the Natural Resource manager will assure the steps outlined in the most recent USFWS guidelines (Appendix 11, as updated via adaptive management) for avoiding Blackburn's sphinx moth take are followed.

The Hawaiian short-eared owl, which is not listed as threatened or endangered on the island of Maui, has been observed at the Property, and may roost or even nest in low vegetation or nest on the ground within the Property. As Hawaiian short-eared owls breed year round, it is not possible to time vegetation clearing activities to avoid potential for conflict with nesting by this species. The Natural Resources Manager will conduct systematic surveys to detect any Hawaiian short-eared owl nesting activity. Vegetation clearing will be suspended within 300 ft (91 m) of any area where distraction displays, vocalizations, or other indications of nesting by adult Hawaiian short-eared owls are seen or heard, and resumed when it is apparent that the young have fledged or other confirmation that nesting is no longer occurring.

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7.1.5 Fencing

The entire perimeter of the Property has already been fenced to exclude cattle from the kiawe-wiliwili shrubland. This fence will be replaced during Phase I with an ungulate-proof fence to effectively exclude non-native axis deer, goats, as well as cattle from further damaging native plants. The fence will be constructed using corrosion-resistant galvanized steel materials, and will be approximately eight feet in height with mesh size of no more than six inches. All ungulates will be removed from the Property using humane methods, as described in the Animal Management Plan for Honuaʻula (SWCA 2010a). Temporary fences will be erected around the native plant preservation and conservation areas to prevent any construction-related impacts to native plants and cultural sites in these areas. This may include the use of silt fencing to limit sediment runoff from upslope construction areas. All fencing will be inspected on a daily basis and repaired when necessary.

7.1.6 Best Management Practices

Honuaʻula Partners, LLC will implement best management practices to ensure that construction activities do not harm any Covered Species at the Property, and to minimize erosion and sedimentation runoff. These measures include those outlined in the Transportation Management Plan by Austin, Tsutsumi, and Associates Inc. (2009) and approved by both the County of Maui and Hawaiʻi Department of Transportation and measures recommended by the U.S. Fish and Wildlife Service (Apr 08, 2009) with regard to minimizing impacts to natural resources (Appendix 6). These measures include, but are not limited to:

- Erecting signs to delineate parking areas, speed limits, disposal sites, etc.
- Careful selection of a staff parking area at a sufficient distance from the on-site Native Plant Preservation Area and Plant Conservation Areas to minimize potential impacts to resources and wildlife protected in those areas.
- Establishing a speed limit of 15 miles per hour for all vehicular traffic at the Property to limit strike hazard to Covered Species, in particular nēnē and short-eared owls.
- Limiting outdoor lighting to the period outside of fledging season for the endangered Hawaiian petrel and Newell's shearwaters, which falls between September 15 and December 15. In compliance with DOH regulations, construction can only be performed between 7:00 a.m. and 6:00 p.m., Monday through Friday, and 9:00 a.m. and 6:00 p.m. on Saturdays (Austin, Tsutsumi and Associates, Inc, 2009). Therefore, no nighttime construction will be performed. However, if outdoor lighting is required during construction, the use of lights should be limited during the fledging season for the endangered Hawaiian petrel and Newell's shearwaters (September 15- December 15).
- Establishing appropriate buffer zones around any candidate, threatened, or endangered species found at the Property during the pre-construction surveys, until threat to the species no longer exists (see section 7.1.2.4).
- Implementing deterrent methods to keep endangered waterbirds from utilizing temporary retaining basins during construction.
- Installing sediment barriers such as silt fencing along the bottom of a slope and down gradient of a disturbed area, especially in areas upslope of the Native Plant Preservation Area and Plan Conservation Areas.

<u>Operation Phase Avoidance and Minimization Measures</u>

7.1.7 Roadways (Speed Limit)

Permanent speed limits will be posted throughout the Property to minimize collision with Covered Species and other native wildlife. In addition, speed bumps will be installed on roadways wherever necessary to ensure compliance with posted speed limits. Speed limits across the Property will be 15 mph. If one or more nēnē do become present on the Property, specific signs signaling their presence along roads will be installed.

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7.1.8 Seabirds: Lighting

External lighting at the Property and its associated buildings and facilities are subject to Maui County Code Title 20, Chapter 35, regulating outdoor lighting standards. This chapter prohibits the use of broad-spectrum mercury vapor lights, and mandates that lights are either fully shielded, or imposes usage restrictions on lights that may be partially shielded. These conditions are intended to minimize fallout of juvenile seabirds.

In addition, external light at the Property will be designed to ensure that light attraction to seabirds is minimized to the maximum extent practicable. External lighting associated with the proposed development, including parking areas, accent lighting, and external building illumination, will follow existing recommendations from USFWS (Appendix 10) and will be of the following types: shielded lights, cut-off luminaries, or indirect lighting.

7.1.9 Management and Maintenance

Regular management and maintenance activities at the Property are not expected to result in any adverse impacts to Covered Species. However, the following steps will be taken to further ensure the minimization and avoidance of impacts:

- The Natural Resources Manager will notify management and maintenance personnel of the location of any nests or individuals of Covered Species, and will provide guidelines on avoiding impacts to these species.
- All management and maintenance staff will be required to attend the endangered species training, described above, on an annual basis.
- Management and maintenance staff will report all activity and presence of Covered Species at the property to the Natural Resources Manager.

7.1.10 Owners and Residents (Covenants, Conditions and Restrictions; CC&R)

To assure compliance with conditions associated with lighting, leash laws, landscaping and others that may affect Covered Species, the Applicant may include provisions in the CC&Rs.

7.1.11 Golf Course Operations

Concerns with regard to attraction of nēnē and waterbirds and subsequent impacts on these species are primarily related to golf course features. Because the golf course will not contain any permanent water features, attraction of waterbirds to the Property is not expected, however, any measures described below to minimize harm to nēnē, may also be applied to other waterbirds if, for unforeseen reasons, they do become attracted to features associated with the golf course.

- All management and golf-course maintenance staff will be required to attend the endangered species training annually.
- The Natural Resources Manager will ensure that the golf course Marshalls and Starters receive training in identification of Covered Species, and in measures to avoid and minimize harm to the Covered Species. This may include measures in response to injured or dead Covered Species, non-harmful means to encourage Covered Species to leave areas in which they are at risk of harm, or measures to discourage them from occupying such areas. This training will be in addition to the regular required endangered species education.
- If Covered Species are observed or anticipated at the golf course, the Natural Resources Manager will brief the golf course personnel on the status of these species at the golf course, and provide instructions on appropriate measures to minimize or avoid harm to these species.
- When Covered Species are observed or anticipated at the golf course, the golf course Starter will inform every golfer about the presence of the Covered Species. Each golfer will receive a briefing including information about the protected status of the Covered Species under the ESA and HRS 195D, the necessity of taking measures to avoid harm to the species, and about any golf course rules that apply to these situations.

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- If Covered Species are observed foraging, transiting, or even nesting at areas of the golf course where they may be at significant risk of harm from golf-related activities, the Natural Resources Manager, marshal, or Starter may temporarily halt play in that location until the animals have relocated.
- If any dead or injured Covered Species are found on the golf course a wildlife recovery and response protocol will be implemented. This protocol will be developed with consultation of USFWS and DLNR, and a draft is included in Appendix 7.
- An endangered species education program will be developed for the golf course. Features that may be included in this education program are brochures or placards to be issued to each golfer, educational materials such as informational panels or posters will be placed at the pro shop or an educational kiosk. An educational program is anticipated to be very effective, since this will be a private golf course, and most players will be regulars and residents of the development.
- Players will be instructed to contact the Starter or Marshall on duty when Covered Species are observed on the golf course, or when there are any concerns regarding Covered Species.

7.1.12 Avoidance Measures for the Hawaiian Hoary Bat

Trees 15 feet or more in height will not be cleared for construction between June 1 and September 15 when non-volant Hawaiian hoary bat juveniles may be present at the Property, pursuant to recent USFWS guidance based on available literature and data. The Natural Resources Manager or other qualified wildlife biologist will monitor for bats prior to vegetation clearing to further insure no impacts to juvenile bats will occur.

Any fences built for the project will have a barbless top-strand of wire to prevent entanglements of the Hawaiian hoary bat on barbed wire.

7.1.13 Avoidance Measures for Direct Take of Blackburn's Sphinx Moths

To avoid direct take of Blackburn's sphinx moths, Honuaʻula Partners, LLC will follow the USFWS protocol (Appendix 11) for the removal of tree tobacco. This includes measures such as checking trees for sign of larvae, leaving trees with larvae or sign of larvae for 30 days, cutting trees without sign or larvae at ground level and leaving the root ball and soil in the surrounding 30 foot (10 m) radius for a period of one year before ground disturbance. Checking trees for presence or sign of larvae will be overseen by Natural Resource Manager or other delegated personnel trained by the Natural Resource Manager.

Impacts to Blackburn's sphinx moths resulting from light attraction at Honuaʻula are not considered likely. Moths are known to be attracted to lights and light attraction may cause the moth to strike an object or otherwise fall to the ground where it could be exposed to predation or other stressors. USFWS has acknowledged that quality of darkness may be a factor in adult Blackburn's sphinx moth behavior, but this issue was not taken into account when critical habitat was designated due to a lack of prior studies of the issue (USFWS 2003). Flight to light distances of sphingid moths have been shown to be less than 33 feet (10 m), and the effective radius of a 125 watt mercury vapor light is a mere 9 feet (3 m) (Frank 2006). The short flight to light distance along with a very low density of moths results in a very low expected risk of light impacts to Blackburn's sphinx moths at Honuaʻula. Furthermore, the Property is located within an urban area that already has a high level of ambient lighting. This minimizes the chances of light attraction for moths by reducing flight to light behavior (Frank, 1988, 2006). This would significantly dilute the effect of additional lights installed at Honuaʻula. Nonetheless, potential impacts will be avoided by reducing light pollution as recommended by the USFWS for avoidance of light impacts to seabirds. In addition, light fixtures will be placed away from areas in which moths may become trapped and tightly sealed to avoid entrance of moths as recommended by Frank (2006).

External lighting at the Property and its associated buildings and facilities are subject to Maui County Code Title 20, Chapter 35, regulating outdoor lighting standards. This chapter prohibits the use of broad-spectrum mercury vapor lights, and mandates that lights are either fully shielded, or imposes usage restrictions on lights that may be partially shielded.

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7.2 Selection of Mitigation Measures

Honuaʻula Partners, LLC coordinated with biologists from USFWS, DOFAW, SWCA, and members of the ESRC to identify and select appropriate mitigation measures to compensate for the potential incidental take of two Federal and/or State-listed species during construction or operations at the Honuaʻula Property. In addition, mitigation is designed to ensure USFWS and DOFAW Permit issuance criteria are met. The criteria used for determining the most appropriate mitigation measures include:

1. The level of mitigation should (at least) be commensurate with the currently anticipated take;
2. Mitigation should be species-specific and, to the extent practicable, location or island specific;
3. Mitigation measures should be practicable and capable of being done given currently available technology and information;
4. Mitigation measures should have measurable goals and objectives that allow success to be assessed;
5. Mitigation measures should be flexible to adjust to changes in the level of take according to new information during project operation;
6. Should be consistent with or otherwise advance the strategies of the respective species' draft or approved recovery plans;
7. Mitigation measures that serve to directly "replace" individuals that may be taken (e.g., by improving breeding success or adult and juvenile survival) are preferred, though efforts to improve the knowledge base for poorly documented species also have merit, particularly when the information to be gained can benefit future efforts to improve survival and productivity;
8. Off-site mitigation measures of resources located on otherwise unprotected private land are preferred over those on public land, and sites on state land are preferred by USFWS over those on federal land;
9. Measures to decrease the level of take resulting from a private activity unrelated to the project are generally considered the responsibility of the other party and are not preferred as mitigation; and
10. Alternate or supplemental mitigation measures should be identified for future implementation if the level of take is found to be higher (or lower) as a result of monitoring.

Federally and/or State-listed species considered to have potential to be incidentally taken during the life of the project are the Blackburn's sphinx moth, and the Hawaiian goose, or nēnē. The mitigation proposed to compensate for impacts to these species is based on anticipated levels of incidental take as determined through on-site surveys, off-site information gathering, and modeling. The primary goal of the proposed mitigation measure is to directly offset habitat lost at the Property, and increase populations of the Covered Species to aid their recovery.

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7.3 General Measures

This plan addresses general mitigation measures designed to minimize and offset loss of habitat and components of the native communities at the Property as a result of construction and operation of Honuaʻula, that are in addition to the required mitigation measures for take of, or loss of habitat for, Covered Species. The general mitigation measures are the establishment of an on-site plant conservation easement and the implementation of a conservation plan. In addition to these measures, native plants will be protected and managed within Plant Conservation Areas located throughout the Property.

7.3.1 Native Plant Preservation Area

Honuaʻula Partners, LLC will establish a perpetual on-site conservation easement over an area of approximately 40 acres within the remnant kiawe-wiliwili shrubland (Figure 1.2), which will encompass most nehe (*Lipochaeta rockii*) plants as well as all ʻāwikiwiki (*Canavalia pubescense)* plants found at the Property (Table 6.1). The easement will be established at the initiation of Phase I construction. The scope of the Native Plant Preservation Area will be set forth in an agreement between Honuaʻula Partners, LLC and the County that shall include: 1) a commitment from Honuaʻula Partners, LLC, its successors and permitted assigns, to protect and preserve the Native Plant Preservation Area for the protection of native Hawaiian plants; 2) use of the Native Plant Preservation Area will be confined to activities consistent with the purpose and intent of the Native Plant Preservation Area; and 3) no development other than fences, and interpretive trails will be allowed within the Native Plant Preservation Area. Interpretive trails will be minimal in size, and shall not consist of imported materials, hardened surfaces, and care will be taken to minimize impacts to native plants during establishment of trails. Existing jeep roads will be used to the maximum extent practicable.

The Native Plant Preservation area will consist of two separate, but conjoined easements (figure 1.2). Easement A, the eastern portion of the Native Plant Preservation area comprises approximately 4 acres. Easement B contains the remaining area of approximately 36 acres. The purpose of establishing two separate easements is to allow for a simple, minimal golf cart path through easement A to connect golf course hole 10 with tee 11. The easements will be substantively identical in all other material respects. This paved path will be approximately 10 feet wide and will have no lights. Only golf carts and no other vehicles will be allowed passage. The acreage of easement A will be slightly more than 4 acres to include the area occupied by the golf cart path, so 4 acres will be conserved at a minimum. Other than the provision for the golf cart path in easement A, both easements will be identical.

Title to the Native Plant Preservation Area will be conveyed to a land trust or non-profit organization that holds other conservation easements prior to Phase 1 construction. Access to the area will be permitted pursuant to an established schedule specified in the Conservation / Preservation Plans to organizations on Maui dedicated to the preservation of native plants, to help restore and perpetuate native species and to engage in needed research. These organizations may enter the Native Plant Preservation Area at reasonable times for cultural and educational purposes only.

The Native Plant Preservation Area will initially be protected by a construction grade perimeter fence, which eventually will be replaced by a rock wall with the primary purpose of minimizing trespassing. In the event that the entire Property is fenced at the start of construction, the temporary fencing around the Native Plant Preservation Area may be limited to temporary construction fences or similar barriers, to protect the area from accidental impacts from construction activities.

Invasive weeds will be removed from the preserve and total cover of all invasive plants will be maintained at less than 50%. Incipient weed removal will be ongoing. Tree tobacco will not be removed from the preserve as this is a recognized host plant for the Blackburn's sphinx moth, unless directed to do so by USFWS and DOFAW. These agencies may establish a maximum stem count to limit the abundance of tree tobacco in the Native Plant Preservation Area. Weed control may include manual, mechanical, or chemical control methods, or a combination of these methods. Specific species, currently occupying the site, to be targeted include koa haole, guinea grass, and other fire-prone alien grasses. Rats, which limit recruitment of native plants through browsing and seed predation, will be controlled using appropriate bait stations and/or traps in a grid throughout and

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around the preserve. Methods will be developed through consultation with U.S. Department of Agriculture Animal Damage Control, USFWS and DLNR. State Department of Health (DOH) best management practices will be implemented. Restricted pesticide use will be performed or overseen by a licensed applicator, and in coordination with applicable government conservation agencies as required by the label. Feral ungulates will be excluded from the entire Property and will no longer be a threat to the native plants within the Native Plant Preservation Area.

The Natural Resources Manager will implement a program to translocate scattered, rarer, native plants occurring outside of the Native Plant Preservation Area or Plant Conservation areas (see section 7.3.2 below) to appropriate areas within the boundaries of these protected areas. If necessary, conditions may be temporarily improved to augment the health of rare (non-listed) species by supplying supplemental shade, water, fertilizer, or mulch. In addition, propagated dry forest plant species may be out-planted within the Native Plant Preservation Area, as appropriate. This may include native host plants for the Blackburn's sphinx moth. The primary constituent elements for Blackburn's sphinx moth larvae, ʻaiea (*Nothocestrum* spp.) will be considered for propagation and out-planting at the Native Plant Preservation Area. The outcome of this effort is unknown because the Property lies at lower elevation than the distribution reported for the species (Wagner et al 1999). Considerations and plans for translocating and outplanting at the Property may be provided for in the Landscape Plan.

7.3.2 Plant Conservation Areas

In addition to the Native Plant Preservation Area described above, Plant Conservation Areas will be located throughout the Property adjacent to both the golf courses and the Native Plant Preservation Area. The areas will include all the existing natural gulches throughout the Property (28 acres), as well as ungraded conservation areas (8 acres) in which existing native plants will be protected and which will be managed as natural areas, and areas containing naturalized landscape and in which existing native vegetation will be conserved or enhanced. These areas combined will add an additional conservation area of 36 acres in which existing native plants will be protected. Management strategies employed for these Plant Conservation Areas may include measures listed above for the Native Plant Preservation Area (Section 7.3.1). Due to the fragmented nature of these areas, these will be considered part of the area in which habitat take occurs for purposes of the HCP, even though native plants will be protected in these areas.

7.3.3 Conservation Management Plan

Honuaʻula Partners, LLC will implement a management plan based on a Conservation and Stewardship Plan (CSP) prepared by SWCA and published in the Final EIS (PBR Hawaiʻi 2012). The purpose of this management plan was to identify measures to be taken to avoid and minimize impacts including establishment and management of a perpetual on-site native plant preservation easement. The goals and main elements of this plan have been incorporated into this HCP. The management plan will be revised and finalized prior to the start of Phase 1 construction based on agency and public comments on this HCP. The goals of the CSP are to preserve elements of the remnant kiawe-wiliwili shrubland, as much as possible, and to protect native plants and animals within the immediate area affected by construction of the proposed Honuaʻula community. The secondary goals of the CSP are to cooperate with researchers in furthering the science of native plant propagation, provide education and outreach opportunities, and enhance the natural beauty of the proposed Honuaʻula project. CSP objectives, some of which have been described above as part of the avoidance and minimization strategy and in the description of the on-site Native Plant Preservation Area and Plant Conservation Areas, include:

i. Establish a position for an on-site Natural Resources Manager (Sect. 7.1.1.1).
ii. Construct a deer fence around the eastern and southern boundaries of the 670-acre Property (Sect. 7.1.1.5).
iii. Remove all ungulates from within the entire Property (Sect 7.1.1.5).
iv. Control noxious invasive plants (Sect. 7.3.1; 7.3.2).
v. Protect and propagate native plants from local seed stocks (Sect 7.3.1; 7.3.2).
vi. Attempt to propagate native host plants for Blackburn's sphinx moth within the Native Plant Preservation Area (Sect 7.2.1)
vii. Develop a fire control plan (Natural Resources Manager in consultation with USFWS, DLNR, and other entities as appropriate). The purpose of this plan is protection of the Native

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Plant Preservation Area and the Plant Conservation Areas from fire damage. This plan will be in place before ungulates are removed from the Property.

viii. Control of non-native seed predators to the maximum extent practicable.

ix. Implement a monitoring program (Natural Resources Manager in consultation with USFWS, DLNR, and other entities as appropriate). The purpose of this monitoring will be to accurately establish a baseline to evaluate efficacy of management activities, and identify threats to the Native Plant Preservation Area.

x. Landscape the Property with native plants from local seed stock.

xi. Manage the Native Plant Preservation Area and the Plant Conservation Areas with the cooperation of stakeholders: Honua'ula Partners, LLC will attempt to involve a wide range of stakeholders in the management of the Native Plant Preservation Area. The Natural Resources Manager will work with the University of Hawaii, Maui Invasive Species Council, Leeward Haleakala Watershed Alliance, State DLNR, and others, as appropriate, to conduct detailed scientific inventories and monitoring programs to develop an accurate baseline and ongoing monitoring to evaluate the efficacy of management activities and identify imminent threats to the preserve. Honua'ula Partners, LLC will make an effort to continually disseminate useful information to all stakeholders.

xii. Develop a public education and outreach program (Natural Resources Manager) (Sect 7.1.1.2). This will include sponsoring service trips to assist with management activities, field trips for island students, and development of interpretive signs to encourage public cooperation and discourage trespassing through the Native Plant Preservation Area.

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7.4 Off-Site Mitigation Measures

Mitigation measures to offset impacts to the Blackburn's sphinx moth and its habitat have been designed in consultation with USFWS, DLNR, Dr. Art Medeiros, and Andrea Buckman (Leeward Haleakala Watershed Restoration Partnership), Dr. Dan Rubinoff (Lepidopterist, UH Mānoa), and facilitated with the cooperation of Mr. Sumner Erdman (ʻUlupalakua Ranch). This process included identification of:

a) Other areas on Maui containing valuable habitat for Blackburn's sphinx moths;
b) Management and protection of these areas from current and future threats, and;
c) Availability of these areas for perpetual conservation easement.

The assessment of suitable off-site mitigation areas has focused on areas with similar geology as the Property in areas where restoration of native larval host plants (i.e. *Nothocestrum*) is feasible. Lands that were taken into consideration include Puʻu o Kali, Auwahi, Ahihi-Kinaʻu, and Kanaio areas, as well as parcels within Mākena Resort and ʻUlupalakua Ranch located adjacent to the Property. It might be argued that some of these areas are more similar to the Project area in terms of geology, slope, rainfall, and plant species composition; however these areas are either not available for purchase or transfer, or have been excluded as mitigation options by USFWS or DLNR because they are already protected. Honuaʻula Partners, LLC has approached Makena Resort, ʻUlupalakua Ranch, Haleakala Ranch, and the State Department of Hawaiian Homelands in efforts to secure mitigation sites in the vicinity of the Property, but none of these options were determined to be appropriate or available mitigation sites. Puʻu o Kali was considered because of its similar geology and plant composition, and because it is considered a high priority area for native dryland species including ones occurring at the Property, but USFWS considered this area to already be protected, and it was subsequently disqualified as a potential mitigation site.

Honuaʻula Partners, LLC proposes to implement significant mitigation measures that will result in a substantial net benefit for the Blackburn's sphinx moth and its native habitat. In addition to establishing and managing the on-site Native Plant Preservation Area (described above), Honuaʻula Partners, LLC proposes two principal Blackburn's sphinx moth mitigation areas: the approximately 164-acre Kanaio mitigation area and approximately 190 acres of the Auwahi Forest Restoration Project site.

7.4.1 Off-Site Mitigation Areas

In addition to the 40 acres of habitat that is being preserved on-site (see Section 7.3.1), Honuaʻula Partners, LLC shall, based on research and consultation with USFWS and DOFAW, mitigate the loss of habitat (130 acres of marginal Blackburn's sphinx moth habitat and 497 acres of severely degraded Blackburn's sphinx moth habitat) at the Property with the perpetual preservation and management of a total of 354 acres of native dry shrubland and forest habitat on privately owned lands at ʻUlupalakua Ranch. This off-site mitigation acreage exceeds USFWS's recommended mitigation offset ratios (two acres conserved and managed in perpetuity for each acre of marginal Blackburn's sphinx moth habitat developed and one fifth of an acre restored and conserved in perpetuity for each acre of degraded moth habitat developed (Dawn Greenlee, pers. comm). Perpetual conservation easements and preservation will be implemented over approximately 164 acres of currently unprotected, privately-owned lands at Kanaio, in an area that is widely acknowledged to harbor significant populations of Blackburn's sphinx moth and its native host plants on Maui. In addition, perpetual preservation and restoration of approximately 190 acres within the Auwahi Forest Restoration Project, a currently partially protected, privately owned land that is part of what was once described as one of the richest botanical regions in Hawaiʻi, will be put into place. In total, 394 acres of Blackburn's sphinx moth habitat will be afforded perpetual preservation and management. This mitigation is expected to result in a net benefit to the Blackburn's sphinx moth pursuant to HRS 195-D and will help increase productivity of moths in the off-site mitigation area that contains a diversity of native larval host plants, some of which are federally and state listed as endangered. Lower-elevation sites considered for mitigation lack native larval host plants and may be surrounded by development and increased risk of mortality for the moths.

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7.4.1.1 Kanaio

After close consultation with the federal and state wildlife agencies, a privately-owned, unprotected parcel was identified as particularly high-quality Blackburn's sphinx moth habitat, due to the abundance of both native larval host plants (i.e. *Nothocestrum*) and adult host plants in abundance (Figure 7.1). This mitigation parcel lies adjacent to the eastern border of Kanaio Natural Area Reserve (NAR), which is considered to be the main stronghold for the Blackburn's sphinx moth on Maui, hosting the core population on that island (USFWS 2005, Conant and VanGelder 1998).The proposed Generator Tie Line proposed for Auwahi Wind Farm will cross a cattle corridor between the Kanaio mitigation parcel and the Auwahi mitigation site, and will not cross either mitigation parcel at any point.

The off-site mitigation easement lays within the Kanaio area, which is considered by USFWS (Dawn Greenlee, in maps recently provided to SWCA; USFWS 2005), USGS (Medeiros et al. 1993; and USGS GAP Analysis maps), and VanGelder and Conant (1998) as a premier example of the native dry forest habitat which has been reported to have the highest densities of Blackburn's sphinx moth on Maui (citations above). Interest in the area was sparked in 1984 after the rediscovery of Blackburn's sphinx moth in this area, eventually leading to the establishment of the NAR (Betsy Gagne, NARS Staff DOFAW, personal communication, May 2, 2011). The mitigation parcel is rich in full stature halapepe and ʻaiea trees, as well as tree tobacco, and many native host plants that are consider primary constituent elements for Blackburn's sphinx moth habitat (Medeiros, Loope, and Chimera 1993; LeGrande Biological Surveys 2011).

Following the identification of this prime habitat, Honuaʻula Partners, LLC has been engaged in discussions with the owner of this mitigation parcel, ʻUlupalakua Ranch, and has been able to reach an agreement in principle with ʻUlupalakua Ranch for the conveyance of a perpetual conservation easement over this land as mitigation to offset the loss of Blackburn's sphinx moth at the Property (TMK (2)1-9-001-006 Figure 1.2). To secure this easement, Honuaʻula Partners, LLC will provide the monetary and non-monetary consideration required by ʻUlupalakua Ranch, which will be substantial. The easement will protect in perpetuity a significant area of high-quality habitat that is widely considered to be superior to the marginal habitat at the Property. The easement will be conveyed to a land trust or non-profit organization that holds other conservation easements, approved by DOFAW and USFWS. The easement will be in place prior to initiation of Phase I construction.

Established in 1990, the Kanaio NAR located to the south of the project area encompasses 354 ha (876 ac), portions of which include wiliwili. The reserve is situated between 1100 to 2780 ft (335 to 850 m) elevation on leeward East Maui. The substratum at Kanaio is similar to the southern portion of Honuaʻula and consists of broken ʻaʻā lavas estimated to be less than 10,000 years old (Medeiros et al. 1993). Soils are ʻaʻā flows and very stony lands on a gently sloping (<15%) topography with trench-like channels formed by lava flows when the area was formed. Climate conditions are similar to the Property with arid, windswept conditions and an annual rainfall of approximately 30 inches (750mm). Most of the precipitation comes from periodic Kona storms between October and March (DLNR 2003).

The vegetation at Kanaio can be classified into four different communities, largely determined by the underlying geologic substrate and degree of past disturbance: groves of native trees, native shrublands, lava fields with sparse vegetation, and areas dominated by an assemblage of non-native grasses, shrubs, and herbs. Within the native groves, the reserve contains representatives of three native vegetation types: ʻaʻaliʻi (*Dodonea*) lowland shrublands, lama (*Diospyros*) forest, and wiliwili (*Erythrina*) forest. Although they are highly disturbed and altered, these groves are among the best examples of Hawaiian dry forest left in the State, and are an important component of Hawaiʻi's overall remaining biodiversity (DLNR 2003).

The proposed Kanaio mitigation parcel (Figure 7.1) is located on the same substrate as Kanaio NAR, and is subject to similar threats from ungulate browsing. Medeiros et al. (1993) and SWCA have found a total of 171 species of plants at the off-site mitigation area, 40 percent of which are native to the Hawaiian Islands (19 indigenous species and 49 endemic species). In contrast, the Honuaʻula Property harbors 146 species of plants overall of which 27 percent are native (26 indigenous species, and 14 endemic species). Refer to the table in Appendix 8 for comparison of

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plant species found at the mitigation site and the Property. The vegetation includes all of the elements of the native dry shrubland that is found at the Property, including a similar suite of adult host plants for the Blackburn's sphinx moth, and the larval host plant tree tobacco, as well as ʻaiea. Densities of wiliwili appear to be patchy, but similar to those at the Property. Price et al. (2007) assigned values of 'medium' to 'high' habitat quality for wiliwili within the area encompassing Kanaio and the proposed mitigation area on his habitat quality maps, based on bioclimatic data. The USGS GAP analysis program classified much of the proposed mitigation area at Kanaio as NS: Native shrubland (alien grasses and NS: Native shrubland (Native shrubs), with some patches of XG: Kikuyu grassland/Pasture and Y: Uncharacterized shrubland (Fig 3.2). The Biodiversity Summary and Habitat Quality Assessment by TNC shows the western half of the proposed mitigation site as Threatened Native Ecosystem, and the eastern half as Rapidly Degrading Ecosystem (Fig. 7.2).

The native forests on both the Honuaʻula Property and Kanaio have undergone degradation from decades of disturbance, leading to modification of the original habitat. Most notable is the removal of the understory vegetation as a result of grazing and ungulate trampling, which has led to a change in temperature, moisture, and soil chemistry (Medeiros, et al. 1993). As a result there is poor recruitment of the native trees. The understory at Kanaio has been invaded by non-native species, for example the dense mats of kikuyu grass in some areas, further impeding germination and recruitment. Currently the primary threats to the native dry forest community at Kanaio include the activities of feral goats, deer, and stray cattle, invasion of weed species, wildland fires, and the small population sizes of rare native plants. Fourteen of the native plant species found at Kanaio are listed or are being proposed for listing under the Endangered Species Act. Currently no or minimal management is carried out at Kanaio NAR. Tree tobacco is present at Kanaio, and along with the native ʻaiea it serves as habitat for the larvae of the Blackburn's sphinx moth (VanGelder and Conant 1998). The NAR is not completely fenced. Feral ungulates, particularly goats and cattle, freely roam through the NAR with subsequent damage to native plants. Only recently did the USFWS obtain funding to complete fencing of the Kanaio NAR.

A principal method of offsetting the loss of Blackburn's sphinx moth habitat involves acquisition of a 164-acre perpetual conservation easement on a portion of TMK (2)1-9-001-006 owned by Ulupalakua Ranch. This parcel harbors 171 species of plants, 40 percent of which are native to the Hawaiian Islands (19 indigenous species and 49 endemic species). Honuaʻula harbors 146 species of plants, of which 27 percent are native (26 indigenous species, and 14 endemic species). The Ulupalakua parcel lies adjacent to the eastern boundary of State of Hawaiʻi Kanaio NAR, which is considered to contain particularly high quality habitat for the Blackburn's sphinx moth, and contains native dry land habitat and native host plants for the Blackburn's sphinx moth (Figure 7.1).

a. The conveyance of a perpetual easement has been approved by the land owner, and the easement will be established prior to initiation of Phase 1 construction.
b. An 8 foot ungulate fence currently exists along the northeastern border of the mitigation parcel. This fence will be extended along the remaining borders of the site prior to initiation of Phase 1 construction. The fence will be maintained in perpetuity using endowment funds.
c. Ungulates will be removed from the enclosure using professional removal techniques within two years of initiation of Phase 1 construction. Combined with the fencing, this removes one of the primary threats to the existing Blackburn's sphinx moth habitat at the mitigation site. Ungulate removal is anticipated to take two years, after which the area will be monitored for ungulate presence quarterly and kept free of ungulates.
d. A 10-foot wide green fire break will be established along the perimeter of the fence to prevent fires started outside the parcel from entering the mitigation area. Approximately 50% cover of Kikuyu grass will be maintained in the break at a height of less than 6 inches. Kikuyu grass is retards fire and excludes fire-prone weeds (Smith 1985). This fire break will be established over the course of two years and will be maintained in perpetuity. Vegetation within the fire break may be controlled using manual, mechanical, or chemical control methods, or a combination of these methods. If any portion of the mitigation site is impacted by fire, restoration will be initiated within six months. If any portion of the mitigation site is burned at any time after

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initiation of Phase I construction at the Property, intensive restoration will be initiated in the burned area within one month.

e. A cross fencing plan for adjacent land is being developed in coordination with the landowner, ʻUlupalakua Ranch. Cross fencing will be designed to facilitate rotating cattle grazing in such a pattern to enhance fire control on grazing lands immediately adjacent to the protected area. Fuel management in the areas below (south) of the restoration site will be adequate to ensure a fire igniting at the road below the site will not spread to the mitigation site's location.
f. The cover of non-native species is reduced, within five years of initiation of Phase I construction, to less than 25% cover. Thereafter, cover of non-native species will be maintained at less than 25% in perpetuity. Cover of native tree, shrub, vine, and herb species that were elements of the original forest community will be restored, where necessary within 15 years of initiation of Phase 1 construction and a native dry forest ecosystem will be maintained on the site in perpetuity.
g. ʻĀwikiwiki is suitable for restoration only at the lower elevation Kanaio mitigation site. The species is a short-lived perennial vine that is easy to propagate but difficult to outplant. The recommended strategy to re-establish ʻāwikiwiki at the Kanaio mitigation area would be to conduct seed scattering and experimentation with outplanting technologies. Between years 10-15, an annual average of 10 mature ʻāwikiwiki plants will be present at the Kanaio mitigation area, with an annual range between 0 to 500 plants. This five-year average and range is based on the following biological and distribution information known about the plant: 1) The life-span and population size of ʻāwikiwiki is highly variable depending on weather conditions. Although detailed studies of population dynamics have not been conducted, observational evidence indicates that the species is particularly susceptible to extensive drought, resulting in high multi-annual fluctuations in population size. 2) Similar to other species that are sensitive to rainfall levels, it is expected that ʻāwikiwiki will be present at the mitigation site in the seed bank or in pods on desiccated vines during dry periods when few ʻāwikiwiki individuals are visible. The seeds of ʻāwikiwiki have physical dormancy and therefore can remain in the seed bank for extended periods of time until more favorable conditions allow for germination (Baskin et al. 1999). 3) Currently, the estimated total population of ʻāwikiwiki is fewer than 200 individuals, reduced from an estimated population of 360-500 individuals in 2010 (USFWS 2010, 2012). This five-year average will be maintained in perpetuity at the Kanaio mitigation site.
h. A minimum of 500 ʻaiea plants will be propagated and outplanted to the Kanaio/Auwahi mitigation sites within 10 years of initiation of Phase I construction. In year 15 of the permit and beyond, a minimum of 550 aiea will be maintained within the mitigation sites.

The perpetual conservation easements will be established prior to initiation of Phase I construction. The further protection measures described above (Items a – g) will be implemented upon issuance or activation of the ITP/ITL, which will occur at the initiation of Phase I construction at the Property. The easements will be conveyed to a land trust or non-profit organization that holds other conservation easements, determined in consultation with DOFAW and USFWS.

7.4.1.2 Auwahi

The mitigation area at Auwahi is part of a large (5400 acres) stand of diverse, native dryland forest. The botanist Joseph Rock (1913) described the Auwahi dryland forest on Maui as one of the richest botanical regions in the archipelago. Since then, ungulates (cattle, deer, and pigs), wildland fires, and invasive plants, especially kikuyu grass, have degraded this dryland forest. The proposed mitigation areas are located in the western portion of the Auwahi dryland forest, where the native tree density is the highest. The substratum in this area is similar to that of Honuaʻula and Kanaio, consisting of broken ʻaʻā lava on relatively young lava flows, less than 10,000 years old. Presumably the rough substrate helped protect it from ungulate browsing and fire, resulting in a higher remaining native plant and tree density (Medeiros et al 1998). Auwahi contains very high native tree diversity, with 50 dryland species, including ʻaiea (*Nothocestrum* spp.) and wiliwili, which is still quite common throughout lower Auwahi (Medeiros et al 2009). Furthermore it provides reliable habitat for the Blackburn's sphinx moth and some native birds, including the

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ʻapapane (*Himatione sanguinea*), amakihi (*Hemignathus virens*), pueo (*Asio flammeus*), and rarely the ʻiʻiwi (*Vestiaria coccinea*).

The USGS GAP Analysis Program classified the land cover at Auwahi largely as XG: Kikuyu Grass Grassland/ Pasture, with some NS: Native Shrubland (alien grasses), indicating the prevalence of the kikuyu grass understory. According to the Biodiversity Summary and Habitat Quality Assessment by TNC, the area is characterized as Rapidly Degrading Ecosystem.

The first integrated restoration of Auwahi forest began in 1997 with an interagency effort at the 10-acre Auwahi I enclosure (USGS 2006). The area was fenced and ungulates were excluded. By 2000, kikuyu grass was virtually eliminated from the enclosure with herbicide (1% glyphosate), and its cover was reduced to 2%. Since 2000, volunteer out-planting trips were organized to plant quick growing native plant species, especially ʻaʻaliʻi (*Dodonaea viscosa*), to create microhabitat through shade and leaf litter and deter establishment of non-native species such as grasses and *Bacconia frutescens* (Papaveraceae). Natural reproduction of native species was first observed in 2002. After ten years of restoration, 28 native species were naturally reproducing within the enclosure. In 2009, a much larger enclosure was built at Auwahi, protecting approximately 190 acres of dryland forest, and encompassing the first two Auwahi enclosures (Figure 7.1). Aside from being an unprecedented dryland forest restoration potential, this project will also provide opportunities to study limitations and threats to Hawaiian dryland forests.

Honuaʻula Partners, LLC has been engaged in discussions with the owner of this mitigation parcel, Ulupalakua Ranch, and has been able to reach an agreement in principle with ʻUlupalakua Ranch for the conveyance of a perpetual conservation easement over this land as mitigation to offset the loss of Blackburn's sphinx moth and native plan habitat at the Property. To secure this easement, Honuaʻula Partners, LLC will provide the monetary and non-monetary consideration required by ʻUlupalakua Ranch, which will be substantial. It is expected that the easement will be conveyed to a land trust or non-profit organization that holds other conservation easements determined in consultation with DOFAW and USFWS.

The Auwahi mitigation area will be secured through the enhancement, restoration, and management of 190 acres of a currently unrestored portion of the Auwahi Forest Restoration Project, on land owned by ʻUlupalakua Ranch. The Auwahi Forest Restoration Project is located just north of the above mentioned Kanaio parcel, from which it is only separated by a narrow cattle corridor (Figure 7.1). Habitat restoration is proven to work at this site. After only ten years of restoration efforts at the first Auwahi enclosure, 28 native species were naturally reproducing at the site, including the native larval Blackburn's sphinx moth host plants, as well as native nectar plants.

a. The conveyance of a perpetual easement has been approved by the land owner, and the easement will be established prior to initiation of Phase 1 construction.
b. An 8 foot fence already exists surrounding the approximately 190 acre Auwahi Forest Restoration Project, but ungulate grazing continues in most of the area within the enclosure. As restoration of the site progresses fences will be moved or installed and ungulates will be removed from restoration areas and restoration areas will be kept clear of ungulates.
c. A 10-foot wide green fire break will be established along the perimeter of the fence to prevent fires started outside the parcel from entering the mitigation area. Approximately 50% cover of Kikuyu grass will be maintained in the break at a height of less than 6 inches . Kikuyu grass is retards fire and excludes fire-prone weeds (Smith 1985). This fire break will be established over the course of two years and will be maintained in perpetuity. Vegetation within the fire break may be controlled using manual, mechanical, or chemical control methods, or a combination of these methods. If any portion of the mitigation site is impacted by fire, restoration will be initiated within six months. If any portion of the mitigation site is burned at any time after initiation of Phase I construction at the Property, intensive restoration will be initiated in the burned area within one month.
d. This area is included in the cross fencing plan described in item e in section 7.4.1.1. As it relates to protection of the approximately 190 acre Auwahi Forest Restoration Project, fuel management in the areas below (south) of the restoration site will be

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adequate to ensure a fire igniting at the road below the site will not spread to the mitigation site's location.

e. Kikuyu grass (*Cenchrus clandestinus*) will be removed using a combination of mechanical and chemical removal techniques. The cover of non-native species is reduced, within five years of initiation of Phase I construction, to less than 5% cover. Thereafter, cover of non-native species will be maintained at less than 5% in perpetuity.
f. Native tree, shrub, vine, and herb species that were elements of the original forest community will be replanted. A combined minimum of 500 ʻaiea plants will be propagated and outplanted to the Kanaio/Auwahi mitigation sites within 10 years of initiation of Phase I development. By year 15 of the permit and beyond, a minimum of 550 ʻaiea will be maintained within the mitigation site.

The perpetual conservation easements will be established prior to initiation of Phase I construction. The further protection measures described above (Items a – f) will be implemented in phases at the initiation of Phase I, II, or III construction at the Property, based on federal requirements for mitigation area. The easements will be conveyed to a land trust or non-profit organization that holds other conservation easements, determined in consultation with DOFAW and USFWS.

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7.4.1.3 Protection Offered by Conservation Easements

The offsite mitigation parcels are presently encumbered by an agricultural conservation easement, which protects the site from development but still allows agriculture, including cattle grazing and the development of alternative energy such as wind farms, solar, and geothermal energy generating facilities. The proposed conservation easements will protect the parcels from all forms of land disturbance, including the aforementioned uses, and will only allow activities consistent with conservation of native flora and fauna. The Auwahi mitigation parcel is presently encumbered by a temporary, 10-year easement to facilitate the construction of the USFWS-funded perimeter fence, which has been completed.

7.4.2 Measures of Success

Success of the on- and offsite mitigation efforts for the Blackburn's sphinx moth will be determined as follows:

<u>Honuaʻula</u>

1. A 40 acre conservation easement has been established at Honuaʻula, and its active management plan has been implemented.
2. Ungulates are not present within the site.
3. Native plants dominate the site and non-native plant cover is less than 50 percent. If any portion of the mitigation site is impacted by fire, restoration will be initiated within six months. If any portion of the mitigation site is burned at any time after initiation of Phase I construction at the Property, intensive restoration will be initiated in the burned area within one month.
4. No more than one percent of the area is impacted by hiking trail development,
5. Lights in the vicinity of the Native Plant Preserve are shielded so they are not directly visible from within the Native Plant Preservation Preserve.

<u>Kanaio</u>

1. A 164-acre permanent conservation easement, approved by the Agencies, is in place for the ʻUlupalakua Ranch parcel adjacent to Kanaio prior to the initiation of Phase I construction.
2. An 8-foot tall ungulate fence has been established around the three remaining sides of the easement within two years of initiation of Phase I construction at the Property.
3. Ungulates have been removed within two years of the initiation of Phase I construction at the Property.
4. Cross fencing and fire breaks have been established as described within two years of initiation of Phase I construction at the Property. Fuel management in the areas below (south) of the restoration site will be adequate to ensure a fire igniting at the road below the site will not spread to the mitigation site's location. If any portion of the mitigation site is impacted by fire, restoration will be initiated within six months. If any portion of the mitigation site is burned at any time after initiation of Phase I construction at the Property, intensive restoration will be initiated in the burned area within one month.
5. Within 15 years of commencement of mitigation, the number of adult and larval host plants of the Blackburn's sphinx moth, including ʻaiea, morning glory, halapepe, maiapilo, and ʻilieʻe, will, on average, be higher than the number present prior to mitigation. The average number of adult and larval host plants growing at the site in year 10-15 of this HCP will be maintained (within 20%, and as modified, with the concurrence of the Agencies, to account for changed circumstances) in perpetuity.
6. A combined minimum of 500 ʻaiea plants are propagated and outplanted to the Kanaio/Auwahi mitigation sites within 10 years of initiation of Phase I construction. In year 15 of the permit and onward, there are minimum of 550 ʻaiea within the mitigation sites.
7. The cover of non-native species is reduced, within five years of initiation of Phase I construction, to less than 25% cover. Thereafter, cover of non-native species will be maintained at less than 25% in perpetuity.

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8. Between years 10-15, an annual average of 10 mature ʻāwikiwiki plants will be present at the Kanaio mitigation area, with an annual range between 0 to 500 plants. This population will no longer require outplantings to maintain stable and increasing cover trend, and will be maintained in perpetuity.

Auwahi

1. A 190-acre permanent conservation easement has been transferred for the ʻUlupalakua Ranch parcel adjacent to Kanaio prior to initiation of Phase I construction.
2. Ungulates have been fenced out and removed within two years of the initiation of Phase I construction at the Property.
3. Cross fencing and fire breaks have been established as described within two years of initiation of Phase I construction at the Property.
4. Restoration activities have been completed prior to the expiration of the permit, including the planting of ʻaiea and adult host plants.
5. The number of adult and larval host plants of the Blackburn's sphinx, including ʻaiea, morning glory, halapepe, maiapilo, and ʻilieʻe, moth has increased over the life of the permit.
6. Fuel load and wildfire frequency have not increased.
7. Within 15 years of commencement of mitigation, the number of adult and larval host plants of the Blackburn's sphinx moth will, on average, be higher than the number present prior to mitigation. The average number of adult and larval host plants growing at the site in year 10-15 of this HCP will be maintained (within 20%, and as modified, with the concurrence of the Agencies, to account for changed circumstances) in perpetuity. The 190-acre conservation area remains native forest in perpetuity.
8. A combined minimum of 500 aiea plants are propagated and outplanted to the Kanaio/Auwahi mitigation sites within 10 years of initiation of Phase I development. By year 15 of the permit and in all subsequent years, there are minimum of 550 aiea within the mitigation sites.
9. The cover of non-native species is reduced, within five years of initiation of Phase I construction, to less than 5% cover. Thereafter, cover of non-native species will be maintained at less than 5% in perpetuity.

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Figure 7.1: Offsite mitigation areas.

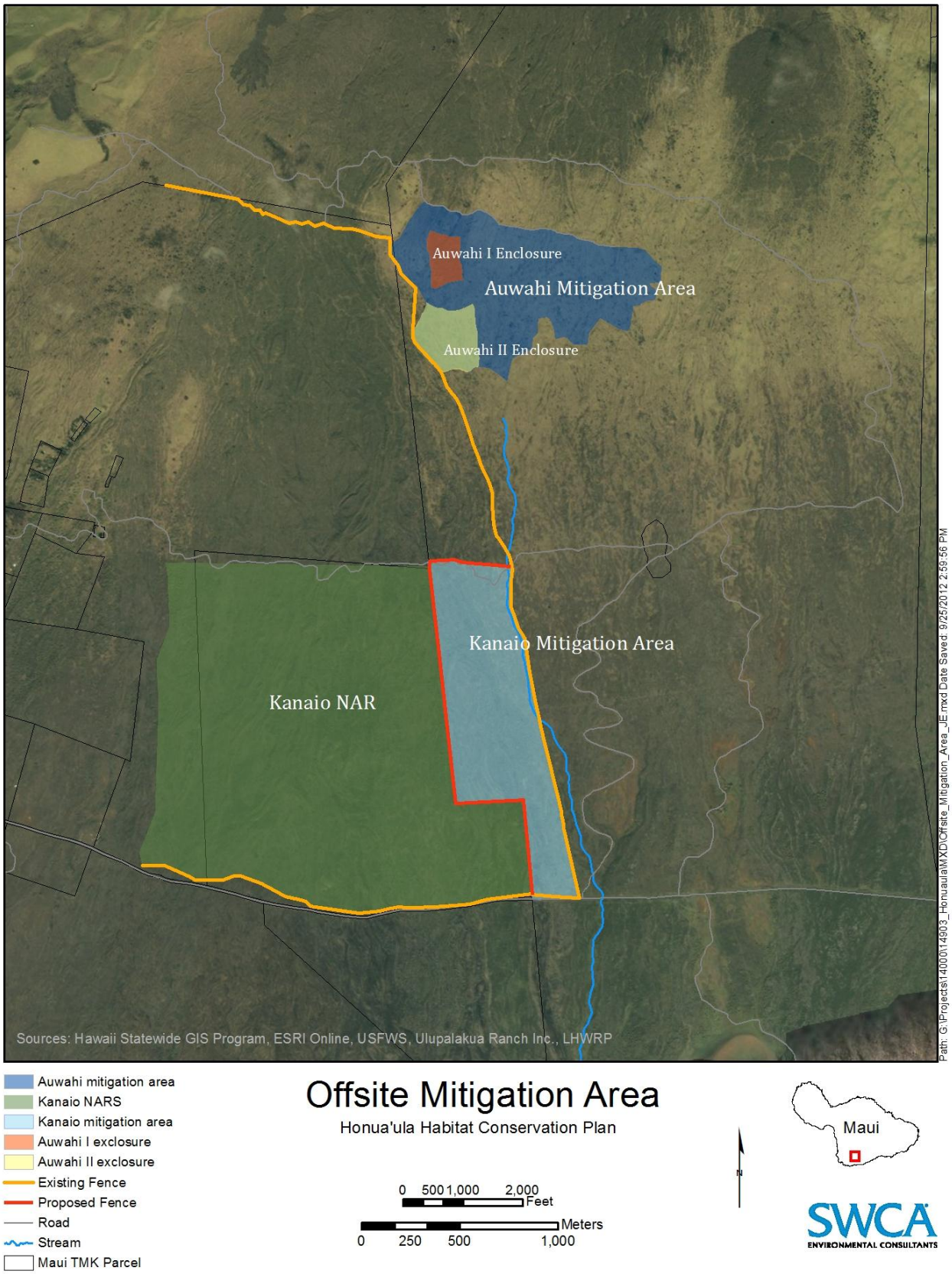

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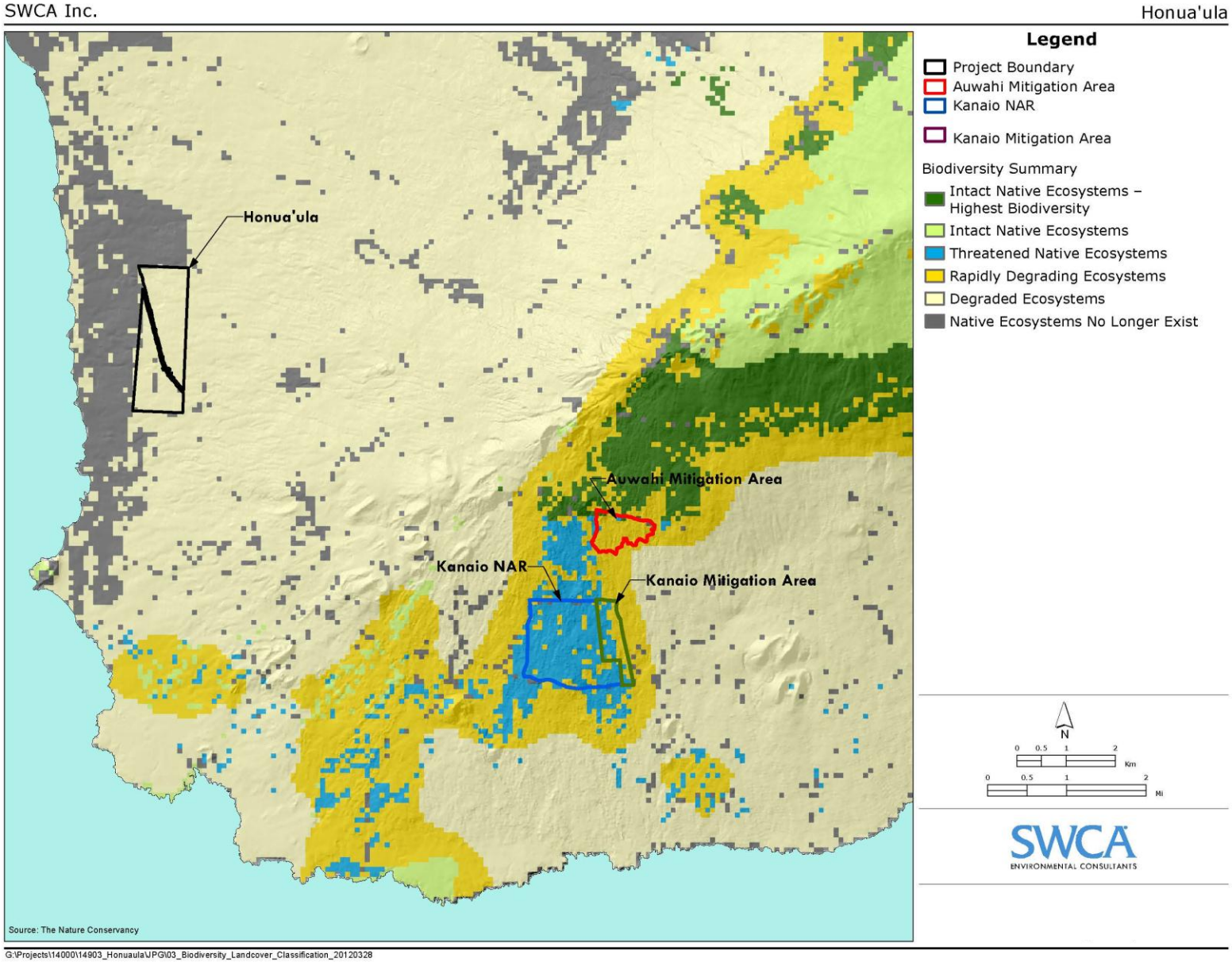
Figure 7.2: TNC Biodiversity Landcover Classification



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7.5 Nēnē

The nēnē mitigation described below was developed with the intention of providing a net ecological benefit to the species in alignment with state and federal species recovery goals. Honuaʻula Partners, LLC will provide support for nēnē population protection and enhancement or nēnē propagation and release, which may include translocation.

The estimated cost for each proposed measure is presented in Appendix 9. All proposed measures are intended to promote the recovery of the species within portions of its historic range.

7.5.1 Nēnē Mitigation

Mitigation for nēnē will take into account the expected direct and indirect take of the species for the life of the project, as well as any loss of productivity that might occur. Mitigation for any direct take of adults and direct or indirect take of goslings or fledglings will be provided through replacement by adults and possibly fledglings. However, when adults are replaced by fledglings, the survival rate of fledglings to adulthood will be taken into account in determining the number of fledglings needed to offset expected levels of take of adult birds.

In addition, because female nēnē mature at age three and males at age two (Banko et al. 1999), the proposed mitigation will also need to account for possible loss of reproduction during the lag years between take of adult birds and the sexual maturity of fledglings with which they are replaced. For the purposes of this HCP the take of a mature female will require accounting for two years of possible lost productivity (an adult lost in Year 1 would be replaced by fledglings in Year 1, with indirect take separately accounted for, no gosling production would occur in Year 2 and 3 because the birds released in Year 1 are still immature; in Year 4 the now adult female released as a gosling in Year 1 could begin reproducing). Only one year of productivity loss will be attributed for the take of a mature male. However, if mitigation results in production of mature nēnē prior to actual incidental take under the ITL/ITP, loss of productivity will not be assessed, essentially lowering the required number of fledglings.

Average loss of productivity through mortality of one adult has been determined to be 0.09 goslings/individual/year (see Section 6.1.4). The mortality rate of captive-reared released goslings to Year 1 was reported to be 16.8% for females and 3% for males (Hu 1998; Banko et al. 1999). For the purposes of this HCP, an annual mortality rate of 17% is assumed to occur for both genders of geese through maturity (age two or three depending on gender). Male and female nēnē are assumed to be equally vulnerable to potential take associated with golf course activities. Table 7-1 identifies the number of fledglings that will be required to be released to offset the level of take anticipated for nēnē during post-build out phase of the project. All take will be replaced with fledglings within the same year or earlier. If increased adult survival can be demonstrated, the estimate can be adjusted accordingly.

Based on a take estimate of four adults and one fledgling over the project life, eight fledglings or five adults will be required as compensation for the requested take.

The proposed mitigation measures for nēnē consist of the following alternatives:

- First, Honuaʻula Partners, LLC proposes to contribute $40,000 to the rehabilitation of nēnē that would otherwise have been removed from the population, and that are released back into the wild. An annual contribution of $5000 will be made for the operating cost of the Hawaii Wildlife Center for five years, in addition to payment of $3000 per bird for the rehabilitation and release of five nēnē. The annual contribution ensures that the facility remains operational for the admittance and rehabilitation of nēnē, and the per bird fee will cover the direct rehabilitation cost of the individual birds. It is anticipated that at a rate of one bird per year, the mitigation requirements will have been met in five years. Contributions to the Hawaii Wildlife Center will be made no later than upon completion of the golf course at the Property, which is anticipated two years after initiation of Phase I construction. The Hawaii Wildlife Center, located in Kapaʻau on the island of Hawaiʻi, is currently the only center with the

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facilities, and expertise to provide services of capture, treatment, recovery, and release of native Hawaiian wildlife including nēnē. Their expert services are outlined in Appendix 5.

- Alternatively the proposed mitigation measures may consist of providing funding of $30,000 to DLNR upon completion of the Honuaʻula golf course for the propagation and release of a total of eight goslings over a three year period. This includes funding toward staffing operations, maintenance, and predator control at the nēnē release facility, and helicopter operations to transport goslings to the release site. These goslings are to be released at a release pen in order to establish a new self-sustaining population on Maui Nui (Maui, Molokaʻi, Lānaʻi, and Kahoʻolawe) as recommended in the nēnē recovery plan (USFWS 2004).

Table 7-1: Mitigation required for nēnē assuming same year replacement.

	Direct take		**Indirect take**	**Total fledglings required**
	Male	**Female**	**Fledglings**	
Total requested take for project life	2	2	1	
Fledglings required	2.9 (=2/0.83/0.83)	3.5 (=2/0.83/0.83/0.83)	1	7.4
Loss of productivity	0.18 (=2 x 0.09 x1 year)	0.36 (=2 x 0.09 x 2 years)		0.5
Grand total for life of project				**7.9**

This calculation for required mitigation uses a 16.8 annual mortality rate for captive-reared females a 9% annual mortality rate for captive-reared males, and an annual loss of productivity of 0.09 individuals per adult. Total estimated direct take is three nēnē for the project life.

- The cost of nēnē gosling production is based on an estimate of $75,000 per year required to run the nēnē breeding facility, with an annual production of 25 goslings. Adults or family groups may also be translocated from Kauaʻi and released at the pen to serve as founders of a new population. Eggs may also be obtained from Kauaʻi and the goslings hatched at the breeding facility for release at the pen. Funding may also be used to maintain or modify the existing quarantine facility to accommodate the species. Goslings are released at around 10 weeks of age, and are close to or at the point of fledgling. Barring health issues, all goslings introduced into the release pen are expected to fledge, thus each gosling released counts towards mitigation. The release will occur at a suitable off-site release pen on Maui as decided with concurrence of USFWS and DLNR. An appropriate release site would be identified in consultation with USFWS and DLNR.

- Currently the captive rearing and release program has been put on hold and resources have been shifted to the translocation of nēnē from Kauai. Therefore, upon recommendation by DLNR, rehabilitation is being proposed as the primary mitigation measure. However, per USFWS recommendation, other alternative mitigation measures may be implemented, including the following:

    - Contribution of funds within the range proposed above for predator control at the Haleakala Ranch release site to help ensure that the birds released at this site successfully establish a population.
    - Contribution of funds within the range proposed above for a rescue pen at Haleakala National Park to support egg and gosling rescue.
    - Contribution of funds within the range proposed above for the purchase of radio transmitters and receivers or satellite transmitters, and/or staff time to support monitoring on nēnē on Maui.
    - Contribution of funds within the range proposed above to support public outreach and education at Haleakala National Park to reduce nēnē mortality at nest sites located within public areas, where nēnē nesting success is particularly low.

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- Funding and implementation of the Nēnē mitigation measures will commence upon completion of the golf course, which is projected at two years after start of Phase I construction.

7.5.2 Measures of Success

Mitigation for nēnē will be deemed successful if the mitigation efforts result in one more adults or fledglings than that required to compensate for the requested take. Extra benefit will be derived from the annual funding for five years of ongoing operations at the Hawaii Wildlife Center.
If goslings are reared and released at a release facility, all adults taken will be replaced by goslings. The mitigation will be deemed successful if the number of goslings that fledge at the pen due to releases or increases in reproductive success due to management exceed the requested take number.

Success of mitigation measures may be measured by an increase in adult or juvenile survival or increased productivity (average number of fledglings per pair) at the release site over baseline levels. In this case, a taken adult may be replaced through increased survival rates of adults in the area or adults may be replaced by goslings. The number of fledglings produced will be the result of the difference in productivity before (baseline) and after the implementation of predator trapping area multiplied by the number of nesting pairs estimated to be within the mitigation area. The number of adults saved from predation will consist of the difference in adult survival rates before (baseline) and after the implementation of predator trapping, multiplied by the estimated number of adults within the mitigation area. Baseline levels will be obtained from a mitigation site with existing baseline data, or based on best available scientific data from other representative sites.

If results of mitigation efforts at the release site do not exceed the baseline productivity or adult survival rates for two years of implementation (to take into account possible annual variations), then adaptive management measures will be implemented. The magnitude and scope of these measures will be determined by the Applicant and approved by USFWS and DLNR based upon monitoring and best available scientific information.

For alternative mitigation measures as directed by DLNR or FWS, for which quantitative success cannot be measured, mitigation will be considered successful if measures have been carried out as described and/or as agreed upon with DLNR and FWS.

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8 IMPLEMENTATION

8.1 HCP Administration

This HCP will be administered by Honuaʻula Partners, LLC with guidance from the USFWS and DLNR. Other experts may be consulted as needed, including biologists from other agencies (e.g., U. S. Geological Survey), conservation organizations, consultants and academia. HCP-related issues may also be brought before the ESRC for formal consideration when deemed appropriate by Honuaʻula Partners, LLC, USFWS or DLNR.

Honuaʻula Partners, LLC will meet at least annually with USFWS and DLNR. Additional meetings and conferences may be called by any of the parties at any time to address immediate concerns. The purpose of the regular meetings will be to evaluate the efficacy of monitoring methods, compare the results of monitoring to the estimated take, evaluate the success of mitigation, and develop recommendations for future monitoring and mitigation. Regular meetings will also provide opportunities to consider the need for adaptive management measures. In addition, Honuaʻula Partners, LLC will meet annually with the ESRC to provide updates of monitoring, mitigation, and adaptive management, and to solicit input and recommendations for future efforts. Additional meetings may be requested by the ESRC at any time to address immediate questions or concerns.

8.2 Monitoring and Reporting

The monitoring program within this HCP will address both monitoring of impacts, and tracking of success of mitigation measures. All monitoring activities onsite and offsite will be coordinated by the Natural Resources Manager, with the aid of trained staff as appropriate. The monitoring of impacts associated with the construction of the site is closely linked to the surveys designed to minimize or avoid these impacts. This onsite construction monitoring includes:

- Pre-construction wildlife surveys. If covered or other listed wildlife is found within the construction area, the area will be treated as described in Chapter 7, and monitored until listed wildlife is no longer present.
- Fences constructed around natural areas, including the Native Plant Preservation Area, will be inspected regularly and any impacts to the vegetation and wildlife within will be monitored and reported.
- All potential larval host plants for the Blackburn's sphinx moth will be checked for presence of larvae or eggs as described in section 7.1.1.13. Occupied host plants will be monitored and treated as described in 7.1.1.13.

Post construction monitoring of impacts on listed species will include:

- Daily monitoring of the golf course for presence of nēnē and other listed species. Presence of listed species on the golf course will be handled as described in section 7.1.1.11. Any impacts to listed species on the golf course will be reported according to section 7.1.1.11 and appendix 7.
- Personnel, including security personnel, will be trained to look for and recognize listed species covered in the HCP, including Blackburn's sphinx moth, Hawaiian petrel and Newell's shearwater. This will ensure ongoing monitoring of the property, particularly the most brightly lit areas, for potential fallout of listed species.
- A sub sample of lights within a half-mile radius from the Native Plant Preserve Area will be checked for downed Blackburn's sphinx moths on a weekly basis. Any Blackburn's sphinx moths found on the Property will be reported according to section 7.1.1.11 and appendix 7.

Monitoring will be an integral part of this plan to ensure that mitigation goals will be met. This will include monitoring of both onsite and offsite mitigation areas.

- Integrity of fences will be inspected on a quarterly basis.
- The onsite and offsite mitigation areas will be monitored at least of quarterly for the presence of ungulates.

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- Success of rodent population suppression at the onsite Native Plant Preservation Area will be monitored at regular intervals using traps and/or tracking tunnels.
- Percent cover of non-native weeds will be monitored on an annual basis.
- Long-term monitoring of mitigation success includes:
    - Blackburn's sphinx moth presence and abundance,
    - Survival and the relative number of host plants,
    - Presence of additional threats to Blackburn's sphinx moth, including ants, and trichogramma wasps.

Other specific measures may be added to the monitoring plan as per recommendation of DLNR or USFWS.

Honuaʻula Partners, LLC will provide annual reports to DLNR and USFWS by August 31 of each year. Honua'ula Partners, LLC will confer with USFWS and DOFAW following the submittal of the annual report to review the results and discuss future HCP implementation issues. These reports will include information on realized take, implementation and success of avoidance, minimization, and mitigation measures as described in this HCP, and other information as requested by the agencies.

Pursuant to chapter 195D HRS, DOFAW may conduct independent monitoring tasks during the life of the permit to ensure compliance with the terms and conditions of the HCP and ITL, and all costs associated with compliance monitoring shall be paid by the applicant.

8.3 Adaptive Management

According to USFWS policy (see 65 Fed. Reg. 35242 [June 1, 2000]), adaptive management is defined as a formal, structured approach to dealing with uncertainty in natural resources management, using the experience of management and the results of research as an on-going feedback loop for continuous improvement. Adaptive approaches to management recognize that the answers to all management questions are not known and that the information necessary to formulate answers is often unavailable. Adaptive management also includes, by definition, a commitment to change management practices when determined appropriate for the benefit of the Covered Species.

The adaptive management program for this HCP addresses any uncertainties in achieving mitigation goals for the Covered Species. For the most part mitigation practices as described in this HCP are not expected to require much adaptive management. However, monitoring of implementation and success of minimization and mitigation measures may lead to implementation of adaptive management. This includes the following measures:

- It is uncertain if and how many nēnē will become attracted to and established on the golf course that is proposed to be part of the development of the Property. The proposed minimization measures have been designed based on best available information at the time of writing. If, despite these minimization measures, take does occur at a higher rate than accounted for in this HCP, Honuaʻula Partners, LLC will consult with DLNR and USFWS about design and implementation of additional or alternative minimization and mitigation measures.
- The mitigation measures to compensate nēnē take are expected to be successful within the timeline specified for the measure. If mitigation cannot be accomplished using that measure within the specified timeline, more time may be allotted or alternative mitigation measures may be initiated.
- Ungulate removal from the fenced areas is expected to occur within the timeline specified in this HCP. However, due to challenges posed by terrain or vegetation, additional time or resources may be necessary to effectively remove ungulates from the mitigation areas.
- USFWS and DOFAW may decide to direct Honuaʻula Partners, LLC to remove tree tobacco from the Native Plant Preservation Area. It may be considered an attractive nuisance should take of Blackburn's sphinx moth be documented on site. Tree tobacco will only be removed from the Native Plant Preservation with approval from USFWS and DOFAW, and in accordance with USFWS tree tobacco removal guidelines.

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- Although a perimeter fence for Kanaio has been funded by USFWS, at this time the fence has not yet been completed. Should the fence be completed and ungulates be removed from Kanaio NAR within two years after initiation of Phase I construction at the Property, the installation of the new section of ungulate fence between the Kanaio mitigation parcel and Kanaio NAR will not be necessary to help protect the area from ungulates. In this scenario funds allocated to the new fence construction may be used for alternative measures, which will be identified with the approval of USFWS and DOFAW, to benefit the Blackburn's sphinx moth and the system on which it depends at the mitigation parcel.
- Offsite mitigation will take place within the Kanaio and Auwahi areas, where it is most likely to have the maximum conservation benefit, subject to landowner and agency approval. It is possible that the exact area description or boundaries of these areas may differ from those indicated on the maps included in this HCP as a result of discussion with ESRC and the landowners. The mitigation will occur within the Kanaio and Auwahi areas, and the total acreage will be as indicated in this HCP.
- The USFWS protocol to minimize and avoid impacts to the Blackburn's sphinx moth (Appendix 11) will be used during construction, and these protocols are expected to be updated as new information may become available. Updated protocols will be used when appropriate.
- Size and specifics of fire breaks may be adapted if new information supporting alternative specifics becomes available.

Further adaptive measures are not anticipated for the measures described in this HCP. However, after review of the annual monitoring report and in consultation with DLNR and USFWS Honuaʻula Partners, LLC may implement adaptive management changes to the avoidance, minimization, and mitigation measures described in this HCP. Furthermore, if new information becomes available during the life of the permit, this may be used to further improve effectiveness of the measures in this HCP.

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8.4 Funding Plan

Consistent with Section 10 of the Federal Endangered Species Act and Chapter 195D of the Hawaiʻi Revised Statutes, this funding plan has been designed to ensure that all the identified mitigation and conservation actions and their associated costs will be funded

Prior sections of this HCP describe a habitat conservation program with measures that Honuaʻula Partners, LLC will undertake to monitor, minimize, and mitigate the incidental take of each covered species, plus provide a net conservation benefit, as measured in biological terms pursuant to Chapter 195D, HRS. This section summarizes planning-level estimates of the costs to implement the conservation program, both during and after the permit term, as well as the proposed timing of the funding and the funding assurances. As described in the funding assurances section below, the developer will be responsible for covering all costs.

All cost estimates are derived/ summarized from the more detailed cost estimates provided in Appendix 9. Cost estimates are stated in constant 2012 dollar terms.

8.4.1 Habitat Mitigation Costs/ Investments

HCP implementation will require investments in habitat preservation, upfront habitat improvements, and on-going habitat management and monitoring, both during the permit term and after the permit term, as described below:

- Land Costs/ Conservation Easements. The HCP proposes an on-site preserve and two off-site mitigation preserves. The developer will secure and dedicate the necessary conservation easements on these areas.

- Upfront Land Improvements/ Investments. The on-site Native Plant Preservation Area and the Kanaio and Auwahi off-site mitigation will require extensive upfront investments in fencing, ungulate and animal removal, and fire breaks. These investments are expected to occur in the first two years of HCP implementation and total about $1.88 million (constant 2012 dollar terms).

- Management, Planning, Monitoring, Education, and Replacement. A number of additional, ongoing expenditures will be required on site management, preserve management, fencing replacement, and other tasks required to ensure the HCP conservation goals are met. During the permit term, from year 1 to year 15, these annual costs are estimated to range from $192,700 to $221,500, in 2012 dollar terms, and total $3.06 million.

- Post-Permit Endowment. Habitat management and monitoring will be required, in perpetuity, beyond the end of the permit term. An endowment sufficient to generate real interest payments (interest over and above inflation) that can cover these ongoing post-permit costs will be required. These ongoing costs are estimated at $191,000 annually. Under the endowment strategy described in the funding section below, an average, annual real interest rate of 3.25 percent is expected. This results in the need for a $5.88 million endowment at the end of the permit.

8.4.2 Funding Strategy

Summary of Funding Approach

The funding approach is based around the following four key components:

1. Direct developer funding of the majority of the mitigation requirements upfront, prior to initiation of Phase 1 construction.

2. Additional funding from secured sources during the permit term.

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3. Full funding of the required post-permit endowment by the end of the permit term to fund all post permit mitigation requirements

4. Placement of the endowment funding in the endowment program of the National Fish and Wildlife Foundation (NFWF) or other entity approved by DOFAW and the USFWS prior to Permit issuance.

Funding by Cost Component

This funding approach includes the following approaches to funding the key cost components described above:

- Land Costs/ Conservation Easements. Full funding of the habitat preservation costs (placement of conservation easements over the on- and off-site preserves) prior to initiation of Phase 1 construction. The developer will directly fund and secure the habitat preservation.

- Upfront Land Improvements/ Investments. Funding of over 75 percent ($1.44 million) of the upfront land improvements/ investments prior to Phase 1 grading, with the remaining 25 percent ($440,000) occurring the year after receipt of the Phase 1 grading permit.

- Upfront Endowment Funding. An investment of $3.0 million in a NFWF or other entity approved by DOFAW and the USFWS prior to Permit issuance, endowment account prior to Phase 1 grading, representing over 50 percent of the full post-permit endowment of $5.88 million required (2012 dollars).

- Permit Term Habitat Management and Monitoring Funding. A property-wide annual assessment of an average of $200,000 each year, secured by a covenant between Honua'ula Partners and USFWS recorded against the land, will provide funding for the estimated $3.06 million (2012 dollars) permit-term habitat management and monitoring costs. This covenant will be in effect for the first 15 years of the permit term, but this term could be reduced if all mitigation requirements have been met.

- Additional Endowment Funding. The additional $2.9 million in endowment funding (beyond the starting balance) will be generated through the property-wide annual assessment and cumulative interest revenues. The property-wide annual assessment will be set to generate an additional $70,000 each year or $1.05 million by the end of the permit term (2012 dollars) These revenues will be paid each year directly into the endowment account, and together with the starting balance of $3.0 million, will generate cumulative interest payments. By the end of the first 15 years of the permit term, under the expected 3.25 percent real interest rate, a total of $1.9 million in interest revenues is expected. Together, the permit term assessment revenue and interest income will provide $2.95 million of additional endowment funding by the end of the permit term, totaling $5.95 million at the end of the permit term.

Endowment Placement and Returns

To ensure the appropriate management of the endowment funding, the developer will place all endowment funding with the NFWF Impact-Directed Environmental Accounts (IDEA) program. This program was established to manage endowments for conservation activities. NFWF staff have indicated that the expected, average annual net real interest rate (inflation and investment management costs removed) is in the 3.25 to 3.5 percent range. In other words, barring unexpected market swings, NFWF expects to be able to provide an average annual return of between 3.25 and 3.5 percent on the mitigation endowments it holds. The lower 3.25 percent rate of return has been applied in this analysis.

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8.4.3 Funding Assurances

Upfront funding of the majority of mitigation costs will remove substantial uncertainty associated with the availability of funding. The developer understands that there will be two endowment sufficiency reviews, one directly prior to the start of Phase 2 grading and the second, directly prior to the start of Phase 3 grading. To the extent that ongoing habitat management and monitoring costs have been higher than expected or the NFWF indicates that a different real interest rate is appropriate, an adjustment to both the endowment funding requirement and the annual assessment will be established. To the extent that additional endowment funding is required, the developer will provide the additional funding prior to the end of the first 15 years of the permit term.

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8.5 Changed Circumstances Provided for in the HCP

Circumstances change or occur during the life of an HCP, some of which can be anticipated and planned for. For Honuaʻula, possible changed circumstances that are anticipated and planned for include: 1) climate change; 2) disease outbreaks in any of the listed species; 3) deleterious change in relative abundance of non-native plant species; 4) hurricanes or other major storms that may affect the project area and/or mitigation sites; 5) changes in the price of raw materials and labor; 6) the de-listing of any species covered in the HCP; and 7) the listing of one or more species that already occur on-site, not currently covered in the HCP.

The procedures to provide for these scenarios are described below:

1) Global Climate Change Significantly and Negatively Alters Status of the Covered Species

   Global climate change within the life of the project (30 years) has some limited potential to alter the current distribution of vegetation communities utilized by the Covered Species through region-wide changes in weather patterns, sea level, average temperature and levels of precipitation (IPCC 2007). In some instances, climate change may cause populations of Covered Species to decline. Covered species are likely to be affected through changes in the distribution of their food resources and possible changes in the vegetation at their preferred nesting habitats. It is unknown how the Blackburn's sphinx moth will be affected by any changes in climate over the life of the Permit due to its presumed ability to utilize non-native habitats. The distribution of nēnē native food resources, particularly at high elevations, may change if climate change alters the range of native plants that they utilize. Nēnē, however, are also able to use a wide variety of non-native food resources.

   With climate change, hurricanes or storms may occur with greater intensity (Webster et al. 2005; U.S. Climate Change Science Program 2009), which may increase the risk of damage to established mitigation sites. This is discussed in Scenario 4 below. Sea level is predicted to rise approximately 1 m in Hawaiʻi by the end of the 21st Century (Fletcher 2009). Given this prediction, any rise in sea level experienced during the life of the project would likely be less than 3 feet (1 m). As mitigation sites are more than 3 feet above sea level, these sites are unlikely to be impacted by sea level rise during the project life.

   Precipitation may decline by 5-10 % in the wet season and increase 5% in the dry season, due to climate change (Giambelluca et al. 2009). This may result in altered hydrology at the mitigation site. Other mitigation sites may be considered for continued mitigation if the existing site is no longer considered suitable. The alternate mitigation site will be chosen in consultation with USFWS and DLNR.

   Vegetation at the mitigation site may also change with decreased precipitation or increased temperatures and wildfire threat. Although changes are expected to be small over the lifetime of the Permit, they are much less predictable in the long term. Should significant changes in vegetation be deemed to be occurring and be demonstrated to affect the productivity of the Covered Species, other mitigation sites may be considered for continued mitigation, if deemed necessary, and will be chosen in consultation with USFWS and DLNR. In all cases, mitigation efforts will remain commensurate with requested take with a net benefit provided to each Covered Species as required by State law.

   Any changes in the mitigation measures implemented for any of the Covered Species due to climate change will be performed to meet the objectives outlined in this document. Modifications to the endowment budget made during the first 15 years of Permit issuance will be made to, based on the best available information, incorporate anticipated project costs associated with a changing climate.

2) Disease Outbreaks in Covered Species

   Nēnē are not considered to be limited by disease, although omphalitis, an infection of the umbilical stump, has been found to cause mortality in both wild and captive nēnē goslings

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(USFWS 2004a). These geese have also been documented to have been infected with avian pox and avian malaria, but no deaths have been attributed to either disease (USFWS 2004a). It is considered possible that the introduction of West Nile virus may affect the survival of nēnē (USFWS 2004a).

Should the prevalence of disease increase dramatically and become identified as a major threat to the survival of these species by DLNR and USFWS, Honuaʻula Partners, LLC will consult with DLNR and USFWS to determine if changes in monitoring, reporting or mitigation are necessary to provide assistance in documenting or reducing the impact of the disease whether the disease is or is not transmitted by humans or is due to human habitat modification.

Any changes prompted by disease outbreaks in the species covered in the HCP will be performed to achieve mitigation objectives. The endowment budget incorporates funding to enable mitigation objectives to be met in the event of disease outbreaks if mitigation actions have not been fully achieved or unmitigated take remains.

3) Deleterious change in relative abundance of non-native plant species, ungulates, parasites, or predators occurring at the mitigation sites for Covered Species.

   Should the proportion or coverage of non-native plant species, parasites, or predators increase at any mitigation site to a point where it is believed that this change is causing significant habitat degradation or loss of habitat, or significant increases in mortality for the Covered Species, thereby resulting in a measurable decline of the species at the site, the Applicant will consult with DLNR and USFWS to determine if measures to prevent the further spread of non-native plants, parasites, or predators are available, practical and necessary. If no such measures are available, mitigation measures for the affected Covered Species may be implemented at another site as determined with DLNR and USFWS. Costs for implementing such measures and consequent changes in monitoring, reporting or mitigation as deemed appropriate by DLNR and USFWS have been incorporated into the mitigation budget in the HCP. These actions will be implemented if mitigation actions have not been fully achieved or unmitigated take remains.

4) Natural Disasters Such as Hurricanes and Severe Storms.

   Natural disasters, including hurricanes and storms, have potential to significantly affect the status of one or more of the Covered Species on Maui and, consequently, alter the relative importance of the incidental take of individuals. Such disasters could also greatly hinder or disrupt mitigation efforts.

   It is not known how nēnē respond to storms or hurricanes. Because nēnē are relatively sedentary, it is presumed likely that individuals of these species would seek available shelter rather than flee when confronted by major storms. The Applicant may implement changes in monitoring, reporting or mitigation to help population recovery or contribute to rehabilitation of habitat for nēnē following a major storm, if deemed appropriate by DLNR and USFWS. If no such measures are available, mitigation measures may be implemented at another site as determined with DLNR and USFWS. Any such measures and consequent changes in monitoring, reporting or mitigation as deemed appropriate by DLNR and USFWS will be implemented. The endowment budget incorporates funding to enable mitigation objectives to be met in the face of anticipated natural disasters if mitigation actions have not been fully achieved or unmitigated take remains.

   It is not known how Blackburn's sphinx moths or their habitat respond to storms or hurricanes. However, Honuaʻula will implement changes in monitoring, reporting or mitigation deemed appropriate by DLNR and USFWS if necessary. The endowment budget incorporates funding to enable mitigation objectives to be met in the face of anticipated natural disasters if mitigation actions have not been fully achieved or unmitigated take remains.

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5) Changes in the Price of Raw Materials and Labor

   Annual reviews will be performed to analyze the costs in the previous year's budget for mitigation expenses and cumulative costs. Annual expenses for subsequent years will be adjusted to meet projected costs based on previous years' expenditures and cumulative spend to date.

6) De-listing of Covered Species

   Should any of the species covered in the HCP be de-listed during the tenure of the permit, it is expected that the mitigation efforts provided by Honuaʻula would have contributed in some part to the de-listing of the species. Therefore, mitigation actions for that species will continue to be performed in accordance with the HCP, unless and until USFWS and DLNR agree that such actions may be discontinued.

7) Listing of One or More Species that Already Occur On-site

   In the event that one or more species that occur on-site are listed pursuant to the ESA, Honuaʻula Partners, LLC will evaluate the degree to which the species is (or are) at risk of being incidentally taken by project operations. If take of the species appears possible, Honuaʻula will then assess whether the mitigation measures already being implemented provide conservation benefits to the newly listed species and if any additional measures are needed to provide a net conservation benefit to the species. Honuaʻula Partners, LLC would then seek coverage for the newly listed species under an amendment to the HCP.

Potential remediation measures to address changed circumstances at the project area or mitigation site(s) are anticipated to improve the overall habitat quality and/or health of the Covered Species following recognition of a changed circumstance. However, these activities also have the potential to impact wildlife and their habitat. Potential impacts from the remediation measures are discussed in the HCP EA.

8.6 Changed Circumstances Not Provided for in the HCP

If changed circumstances occur that were not provided for, or much more severe than described in Section 8.5, and the HCP is otherwise being properly implemented, the USFWS and DLNR will not require any conservation and mitigation measures in addition to those provided for in the HCP without the consent of Honuaʻula Partners, LLC.

8.7 Unforeseen Circumstances and "No Surprises" Policy

Unforeseen circumstances are "changes in circumstance surrounding an HCP that were not or could not be anticipated by HCP participants, DLNR and USFWS that result in a substantial and adverse change in the status of a covered species" (USFWS and NMFS 1996). Under the "No Surprises" policy, with a properly implemented HCP (Hawaiʻi Revised Statues – Section 195D-23), Honuaʻula Partners, LLC will not be required to commit additional land, water, money or financial compensation, or be subject to additional restrictions on land, water or other natural resources to respond to such unforeseen circumstances beyond what has been already agreed upon in the HCP, without the consent of the applicant. For the purposes of this HCP, changes in circumstances not provided for in Section 8.4 that substantially alter the status of the Covered Species are considered unforeseen circumstances.

The "No Surprises" policy assurances only apply to species "adequately covered" in the HCP. Species considered to be "adequately covered" are those covered by the HCP that satisfy the permit issuance criteria under Hawaiʻi Statutes – Section 195D-21. The species considered adequately covered in this HCP, and therefore covered by the "No Surprises" policy assurances, include the nēnē and Blackburn's sphinx moth.

In the event that unforeseen circumstances occur during the term of the Permit and the USFWS and DLNR concludes that any of the Covered Species are being harmed as a result, the agencies

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may require additional measures of the Permittee where the HCP is being properly implemented only if such measures are limited to modifications of the conservation program for the affected species and maintain the original terms of the HCP to the maximum extent possible. Additional conservation and mitigation measures will not involve the commitment of additional land, water or financial compensation or additional restrictions on the use of land, water or other natural resources otherwise available for development or use under the original terms of the HCP without the consent of the applicant.

8.8 Notice of Unforeseen Circumstances

The USFWS and DLNR will have the burden of demonstrating that unforeseen circumstances exist, using best available scientific and commercial data. The USFWS and DLNR will notify Honuaʻula in writing should the USFWS or DLNR believe that any unforeseen circumstance has arisen.

8.9 Permit Duration

The HCP for Honuaʻula is written in anticipation of the issuance of an ITP and ITL to cover the entire project duration of 30 years. The ITL and ITP will be issued, or will take effect, upon initiation of phase I construction at which time anticipated covered activities will commence. This means the 30-year permit duration, and associated activities, will commence at the initiation of phase I construction.

8.10 Amendment Procedure

Different procedures are present that allow for the amendment to the ITL/ITP. However, the cumulative effect of any amendments must not jeopardize any listed species. USFWS and DLNR must be consulted on all proposed amendments and the amendment procedures are listed below.

8.10.1 Minor Amendments

Informal, minor amendments are permissible without a formal amendment process provided that the change(s) necessitating such amendment(s) does not cause a net adverse effect on any of the two Covered Species that is significantly different from the effects considered in the original HCP. Such informal amendments could include, but are not necessarily limited to, routine administrative revisions, changes to surveying or monitoring protocols that do not decrease the level of mitigation or increase take. A request for a minor amendment to the HCP may be made with written notice to USFWS and DLNR. A public review process may be required for the minor amendment. The amendment will be implemented upon receiving concurrence from the agencies.

8.10.2 Formal Amendments

Formal amendments are required when the Applicant wishes to significantly modify the project, activity or conservation program already in place. Formal amendments are required if the change(s) necessitating such amendment(s) could produce a net adverse effect on any of the Covered Species that is significantly different than any of those considered in the original HCP. For example, a formal amendment would be required if the documented level of take exceeds that covered by the HCP's adaptive management program. A formal amendment also would be required if another listed species is found to occur in the project area and could be adversely affected by project activities.

This HCP may be formally amended upon written notification to USFWS and DLNR with the same supporting information that was provided with the original application. The need for a formal amendment must be determined at least one year before permit expiration, as a formal amendment may require additional baseline surveys and data collection, additional or modified minimization and/or mitigation measures, and/or additional or modified monitoring protocols. It may also require a supplemental NEPA evaluation and additional public review.

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8.11 Renewal and Extension

This HCP proposed by Honuaʻula Partners, LLC may be renewed or extended, and amended if necessary, beyond its initial 30-year term with the approval of USFWS and DLNR. A written request will be submitted to both agencies that will certify that the original information provided is still current and conditions unchanged or provide a description of relevant changes to the implementation of the HCP that will take place. Such a request shall be made at least 180 days prior to the conclusion of the permit term. Under Federal law, the HCP shall remain valid and in effect while the renewal or extension is being processed, but under State of Hawaiʻi law, the HCP will remain valid and in effect during processing only if the renewal or extension is processed during the original permit term. The permit may not be renewed for levels of take beyond those authorized by the original permit.

8.12 Other Measures

Issuance criteria under ESA section 10(a)(2)(B) authorize USFWS to obtain such other assurances as may be required that the HCP will be implemented. An Implementing Agreement stipulating the HCP's terms and conditions in contractual form will be signed by all parties (Honuaʻula, USFWS and DLNR).

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9 CONCLUSION

Honuaʻula Partners, LLC looks forward to working with the USFWS, DLNR and the ESRC throughout the approval and long-term implementation of the HCP for the Honuaʻula project. While the construction of Honuaʻula will aid with closing the gap between demand and availability of housing for a variety of consumer types, construction of the community is not without potential for adverse and unavoidable environmental impacts. Honuaʻula Partners, LLC is committed to making all reasonable efforts to avoid, minimize, mitigate and compensate for these impacts as evaluated and determined through the HCP process and its adaptive management strategy to provide a net benefit to the species identified in the HCP through a transparent and consultative process with all parties concerned.

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