

Attachment Botanical Resources

3.6 BOTANICAL RESOURCES

Several botanical reconnaissance surveys of the Property have been conducted since 1988 (Char and Linney 1988; Char 1993, 2004; SWCA 2006; and Altenberg 2007), ~~and~~ SWCA conducted a comprehensive botanical survey of the Property in 2008 (SWCA 2010a). In all, 146 plant species have been identified within the Property, 26 of which are native; 14 of these native species are endemic to the Hawai'i Hawaiian Islands. The remaining 120 species are introduced non-native species.

None of the surveys identified any Federal or State of Hawai'i listed threatened or endangered plant species on the Property. However, five individual plants of the candidate endangered species, 'āwīkīwīkī (*Canavalia pubescens*), have been documented by SWCA (2010a) within the Property. The Property is not located within or immediately adjacent to critical habitat or recovery management units designated by the U.S. Fish and Wildlife Service (USFWS). ~~There~~ Until recently there have been no efforts by any Federal, State, or local government agency, or non-governmental conservation organizations have been undertaken to acquire and/or protect any portion of the Honua'ula Property. ~~The~~ A few non-native tree tobacco (*Nicotiana glauca*) has have been found at various locations widely scattered throughout the Property, and This opportunistic weedy species often appears quickly following grading, mowing, or related land disturbances. ~~While insignificant as an introduced weedy plant species, it~~ The species is a recognized host plant for the Federally-listed endangered Blackburn's sphinx moth (*Manduca blackburni*) (for information on the Blackburn's sphinx moth see Section 3.7 (Wildlife Resources)). However, the plant is not considered as a "primary constituent element" of critical habitat by the US Fish and Wildlife Service for the moth.

SWCA completed the most recent botanical survey of the Honua'ula Property in 2008 (SWCA 2010a), which included the area of the Pi'ilani' Highway extension ROW that traverses the Property (both the portion owned by the State and the portion owned by 'Ulupalakua Ranch), and the area of the Maui Electric substation. To address concerns regarding native plants, SWCA conducted a thorough quantitative assessment of site vegetation to obtain the best possible understanding of vegetation types and plant species present within the Property. Spatially explicit information on the composition and structure of plant communities at Honua'ula was obtained to meet three key study objectives: 1) identify the location(s) of rare plants; 2) develop conservation and management recommendations; and 3) provide support for long-term monitoring and ecological research. Key findings of the SWCA survey are presented below. Appendix E contains the complete survey.

SWCA also completed a botanical surveys of the areas of: 1) the alternative wastewater transmission line alignments for possible connection to the Mākena Resort WWRF, which is located approximately one mile south of Honua'ula; 2) the off-site wells, waterline, and storage tank; 3) the Pi'ilani' Highway widening area which extends from Kilohana Drive to Wailea Ike Drive; and 4) the Wailea Ike Drive and Wailea Alanui Drive intersection

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~~improvement area. The survey did not observe any Federal or State of Hawai'i listed threatened, endangered, or candidate plant species on any of the alignments~~

No Federal or State of Hawai'i listed threatened, endangered, or candidate plant species were observed during the survey of the alternative wastewater transmission line alignments; however the non-native tree tobacco (*Nicotiana glauca*) was also observed (SWCA 2009). Since the botanical survey of the areas of the wastewater transmission line alignments was conducted, a decision has been made regarding which alignment to use based upon potential construction impacts, costs, and permitting considerations. For more information on the selected wastewater alignment for possible connection to the Mākena Resort WWRF see Section 4.8.2 (Wastewater System) and Figure 2. Appendix E contains the complete botanical survey of the alternative wastewater transmission line alignments.

No Federal or State of Hawai'i listed threatened, endangered, or candidate plant species were observed during the survey of the areas of the off-site wells, waterline, and storage tank (SWCA 2010d). Eighty percent of the plant species observed during the survey are introduced to the Hawaiian Islands. Most of the native plants observed during the survey are commonly found throughout Maui and the main Hawaiian Islands. Of the native plants in the survey area, only wiliwili has a limited distribution throughout the Hawaiian Islands. For more information on the off-site wells, storage tank, and waterline see Section 4.8.1 (Water System) and Figure 2. Appendix E contains the complete botanical survey of the areas of the off-site wells, storage tank, and waterline.

No Federal or State of Hawai'i listed threatened, endangered, or candidate plant species were observed during the survey of the Pi'ilani Highway widening area (SWCA 2009c). In addition, no rare native plant species were found. A total of 88 plant species were recorded, of which, three species are native. Two indigenous species, 'ilima (*Sida fallax*) and uhaloa (*Waltheria indica*), were common along both sides of the highway. The third indigenous species, milo (*Thespesia populnea*), was only found at one location adjacent to a homeowner's backyard. For more information on the widening of Pi'ilani Highway see Section 4.4 (Roadways and Traffic) and Appendix R, which contains the complete Pi'ilani Highway Widening Project Final EA. Appendix C of the Final EA contains the complete botanical survey of the Pi'ilani Highway widening area.

No Federal or State of Hawai'i listed threatened, endangered, or candidate species were observed during the survey of the Wailea Ike Drive and Wailea Alanui Drive intersection improvement area (SWCA 2009b). In addition, no rare native plant species were found. A total of 49 plant species were recorded, of which, only glossy nightshade (*Solanum americanum*) is native to, but, common in the Hawaiian Islands. For more information on the Wailea Ike Drive and Wailea Alanui Drive intersection improvements see Section 4.4 (Roadways and Traffic) and Appendix S, which contains the complete Wailea Ike Drive and Wailea Alanui Drive Intersection Improvements Final EA. Appendix B of the Final EA contains the complete botanical survey of the Wailea Ike Drive and Wailea Alanui Drive intersection improvement area.

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Vegetation Types

Within the Honua'ula Property SWCA (2010a) identified three distinct vegetation types:

Kiawe-Buffelgrass Grassland – About 75 percent of the northern portion of the Property consists of *kiawe*-buffelgrass grasslands. There is scattered evidence of *kiawe* logging activities in this area. In addition to buffelgrass, guinea grass (*Panicum maximum*), natal redtop (*Rhynchelytrum repens*), and sour grass (*Digitaria insularis*) are also scattered throughout the northern portion of the Property. Other plants found in this area include the invasive *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 (*Axis axis*). Some open areas that appeared to be heavily grazed were devoid of buffelgrass, but contained the native shrubs 'ilima and hoary abutilon, and the introduced golden crown beard (*Verbesina encelioides*).

Gulch Vegetation – The vast expanse of *kiawe*-buffelgrass in the northern three quarters of the Property is bisected from east to west by several gulches. These intermittent gulches vary in depth and are characterized by patches of exposed bedrock. The gulches are shaded by their steep walls providing relatively cool and moist conditions. Three species of ferns including maiden hair fern (*Adiantum raddianum*), sword fern (*Nephrolepis multiflora*), and the endemic 'iwa'iwa 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. Other species found within the gulches include tree tobacco (*Nicotiana glauca*), *wiliwili*, lantana, partridge pea, golden crownbeard, 'ilima, hoary abutilon, *koa haole*, indigo (*Indigofera suffruticosa*), 'uhaloa (*Waltheria indica*) and lion's ear (*Leonotis nepetifolia*).

Mixed Kiawe-Wiliwili Shrubland – The mixed *kiawe-wiliwili* shrubland ~~vegetation~~ area is limited to the southern 'a'ā lava flow in the southern quarter of the Property. This 'a'ā lava flow comprises approximately 170-acres. Scattered groves of large-stature *wiliwili* (*Erythrina sandwicensis*) and *kiawe* trees co-dominated the upper story. Native shrubs, such as 'ilima and *maiapilo*, and the native vine 'ānunu (*Sicyos pachycarpus*), were represented in the understory. Introduced shrubs (e.g., *koa haole*, lantana, wild basil, and tree tobacco), and introduced grasses (e.g., guinea grass, natal redtop) and introduced vines and herbaceous species (e.g., bush bean, vining solanum, burbush, and golden crownbeard) dominate the ground vegetation. Lantana found throughout the mixed *kiawe-wiliwili* shrubland showed signs of dieback. Although abundant, the guinea grass found on the site was grazed to stubble, probably by axis deer.

Native Species

All of the native plant species reported on the Property (Char and Linney 1988; Char 1993, 2004; SWCA 2006; Altenberg 2007, and SWCA 2010a) are known to occur

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elsewhere on Maui and the main Hawaiian Islands. Only the unique leaf form of Rock's *nehe* (*Lipochaeta rockii*) appears to be limited to the Property; however, it is not recognized as a separate subspecies or variety (Wagner et al. 1999; Herbst, personal communication). One native species, 'āwīkīwīkī (*Canavalia pubescens*), is considered to be a candidate endangered species by USFWS. Five 'āwīkīwīkī vines were found within the Property (SWCA 2010a). Currently, the species appears to be limited to five populations on the Island of Maui, which altogether total a little over 200 between 360 and 500 individuals (USFWS 2009, 2010). The USFWS has chosen not to pursue immediate issuance of a proposed listing rule for 'āwīkīwīkī in lieu of higher priority listing actions, which include other candidate species with lower listing priority numbers (USFWS 2009, 2010). As of October 2011, the USFWS had not changed the status of 'āwīkīwīkī from candidate endangered species (USFWS 2011). Continued status monitoring will be conducted as new information becomes available.

Other native species found on the Property include: *pua kala* (*Argemone glauca*), *alena* (*Boerhavia repens*), *maiapilo* shrubs (*Capparis sandwichiana*), 'a'ali'i shrubs (*Dodonaea viscosa*), 'iwa'iwa ferns (*Doryopteris decipiens*), *pili* grass (*Heteropogon contortus*), Hawaiian moon flower vines (*Ipomoea tuboides*), *wiliwili* trees (*Erythrina sandwicensis*), *naio* trees (*Myoporum sandwicense*), *kolomona* trees shrubs (*Senna gaudichaudii*), *hoary abutilon* shrubs (*Abutilon incanum*), *koali awahia* vines (*Ipomoea indica*), *'ilima* (*Sida fallax*), *popolo* (*Solanum americanum*), *'ilie'e* (*Plumbago zeylanica*), *'uhaloa* (*Waltheria indica*), and 'ānunu vines (*Sicyos hispidus*, *S. pachycarpus*).

The highest concentration of native plants occurs in the southern quarter of the Property, which is the area containing the approximately 170-acre 'a'ā lava flow and the *kiawe-wiliwili* shrubland vegetation type. The remnant native vegetation in the mixed *kiawe-wiliwili* shrubland represents a highly degraded lowland dry shrubland in which *wiliwili* trees are a natural component (SWCA 2010a). Far from being pristine, this dry shrubland has been degraded by human activities including unrestricted grazing by feral ungulates, periodic cattle grazing, and invasion by invasive plant species, road cutting, *kiawe* logging, and World War II military training maneuvers (SWCA 2010a). Until surveys by SWCA (2006) and Altenberg (2007), there had been no recognition of the mixed *kiawe-wiliwili* shrubland as an area worthy of special recognition.

Wiliwili (*Erythrina sandwicensis*) was the most common native tree species in the southern 'a'ā lava flow area. SWCA (2010a) mapped 2,476 individual trees distributed throughout the *kiawe-wiliwili* shrubland in groves of various sizes. The largest groves tended to be located in the eastern portion of the *kiawe-wiliwili* shrubland. Most *wiliwili* trees showed some form of damage, primarily from the *Erythrina* gall wasp (*Quadristichus erythrinae* Kim) and the seed eating bruchid beetle (*Specularius impressithorax* Pie). Although *wiliwili* is not a Federal or State of Hawaii listed endangered species, severe damage caused by the *Erythrina* gall wasp has led to uncertainty about the survival of these trees throughout the State. Thus agency resource managers believe it is prudent to protect remaining trees wherever they naturally occur. However, a parasitic wasp species (*Eurytoma erythrinae*) was released in 2008 by the State Department Of Agriculture as a

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biocontrol. The effort was very successful in mitigating the threat caused by the Erythrina gall wasp.

POTENTIAL IMPACTS AND MITIGATION MEASURES

Honua'ula will not impact any Federal or State of Hawai'i listed threatened or endangered plant species, as none were identified on the Property. In addition, the possible sewer line connection to the Mākena Resort WWRF, the off-site wells, waterline, and storage tank, the widening of Pi'ilani Highway, and the Wailea Ike Drive and Wailea Alanui Drive intersection improvements will not impact any Federal or State of Hawai'i listed threatened or endangered plant species, as none were identified ~~on~~ during any of the alternative transmission line alignments surveys of these areas.

County of Maui Ordinance No. 3554 Condition 27 requires the establishment of a Native Plant Preservation Area on the Property south of latitude 20°40'15.00"N that shall not be less than 18 acres and shall not exceed 130 acres, excluding any portions that the State Department of Land and Natural Resources, the United States Fish and Wildlife Service, and the United States Corps of Engineers find do not merit preservation.

In their letter addressed to William Spence, Director of the County of Maui Planning Department dated February 15, 2012, the DLNR stated:

With regard to Condition 27, we note that the ordinance refers to "preservation". Statutory provisions for the preservation of natural resources are provided in Chapter 195, Hawaii Revised Statutes, through the establishment of the Natural Area reserve System. At this time, the Subject Area is not designated a Natural Area Reserve. Chapter 195 provides a process by which a natural Area reserve may be established.

DLNR also stated: "Mitigation for a project as part of an HPC [Habitat Conservation Plan] may, in principle, be conducted off site if all other requirements are met and if the HCP is approved."

In their letter commenting on the Honua'ula Draft Environmental Impact Statement (EIS) dated July 2, 2010, the USFWS stated: "...we recommend that the conservation easement or Native Plant Preservation Area include a contiguous area of roughly 130 acres (56 hectares) which would encompass the majority of the mixed use remnant kiawe-wiliwili shrubland." USFWS also stated that the Conservation & Stewardship plan (see below and Appendix F):

...has identified numerous proposed mitigation measures and an interest in cooperating with funding off-site conservation projects to offset the loss of habitat within the proposed project footprint. Your Final EIS should also include a description of these off-site conservation projects. In order to fully address this aspect of the project in your Final EIS, we suggest that a 130-acre (56 hectare) Native Plant Preservation Area, located within the southern portion of the property,

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be incorporated into the preferred alternative. Alternatively, your discussion of the project alternatives (Section 6.0) in your Final EIS should thoroughly address any reasons conservation of the entire southern area was not included selected [sic] as the preferred alternative.

Based on the presence of the non-native tree tobacco (*Nicotiana glauca*) and native host plants for the endangered Blackburn's sphinx moth, the USFWS also expressed concern that "habitat loss within the project site could adversely impact Blackburn's sphinx moth populations within this region of Maui."

In their letter dated May 10, 2010 the United States Army Corps of Engineers stated:

The Corps Regulatory Program does not have the legal authority or expertise to comment or make recommendations as to the appropriateness of areas of a parcel for preservation or for use as mitigation, for a particular project, for Maui Planning Commission use.

Since June of 2010 Honua'ula Partners, LLC has met with DLNR and USFWS on many occasions to reach agreement regarding satisfaction of Condition 27. As a result of these meetings, Honua'ula Partners, LLC proposes both on- and off-site measures to protect and enhance native plants and habitat for the Blackburn's sphinx moth (*Manduca blackburni*) as discussed below (also see Figure 1, Figure 12, and Figure 12a).

On-Site Native Plant Preservation Area and Native Plant Conservation Areas

Native Plant Preservation Area – To protect and conserve an area that contains the highest density of representative native plant species within Honua'ula, including the five individual 'āwīkīwīki plants and numerous individual *nehe* plants found on the Property, Honua'ula Partners, LLC will dedicate in perpetuity a conservation easement titled "Native Plant Preservation Area." This In compliance with Condition 27 this area will be dedicated to the conservation of native Hawaiian plants and significant cultural sites (see Section 4.1 (Archaeological and Historical Resources) and Section 4.2 (Cultural Resources) for information on archaeological and cultural resources). The Native Plant Preservation Area will be actively managed in accordance with the Conservation and Stewardship Plan (see below and Appendix F). Management actions will include removal and exclusion of ungulates (deer, cattle, goats, and pigs), removal and control of noxious invasive weeds and plants, and propagation of native plants from seeds collected on the Property.

As shown on Figure 1 and Figure 12, the proposed Native Plant Preservation Area is within the portion of the property south of latitude 20°40'15.00"N as required by Condition 27. It encompasses a contiguous ~~22~~ 40-acre area within the *kiawe-wiliwili* shrubland to protect the portion of the remnant native lowland dry shrubland plant community with the highest densities of selected endemic/native plants having high conservation priority. The proposed size and location of the Native Plant Preservation Area are based, in part, upon a vegetation density analysis employed by SWCA (2010a) to

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aid in defining areas where preservation could be most effective. The size and location of the Native Plant Preservation Area are also based upon scientific research that suggests even small restoration efforts consisting of a few hectares can help provide habitat for native species and can subsequently serve as urgently-needed sources of propagules (Cabin et al. 2000b, Cabin, et al. 2002a). This is reinforced by numerous sources of information on successful propagation of native plants specifically for landscaping (e.g., TNC 1997, Tamimi 1999, Friday 2000, Wong 2003, Bornhorst and Rauch 2003, Lilleeng-Rosenberger and Chapin 2005, CTAHR 2006). The research shows that even small preserves consisting of individual trees are being deemed as appropriate and feasible by USFWS and DLNR when managed in combination with regional preserve areas, such as at La'i'opua on Hawai'i Island (Leonard Bisel Associates, LLC and Geometrician Associates 2008.)

In addition, the Native Plant Preservation Area must be considered in the context of the significant conservation efforts already in existence in South Maui. As previously noted, the remnant native vegetation found on the Property represents a highly degraded lowland dry shrubland, and until recently there have been no efforts by any Federal, State, or local government agency, or non-governmental conservation organizations to acquire ~~and~~ or protect any portion of the Property (SWCA 2010b). Instead, government conservation efforts for native dry forest ecosystems on Maui have focused on better examples of relatively intact ecosystems, such as the 'Auwahi 1 restoration area (10 acres) and Pu'u o Kali (236 acres) Forest Reserves and the Kanaio (876 acres) and 'Ahihi-Kina'u (1,238 acres) Natural Area Reserves (SWCA 2010b). In addition, in 2009 over ~~12,000~~ 11,000 acres in South Maui were ~~recently~~ donated to the Maui Coastal Land Trust—the state's largest conservation easement—representing a significant area of dry forest habitat that will be forever protected. These existing conservation efforts protect ~~substantial~~ habitats that ~~are more intact~~ host higher diversity of known native host plants for the Blackburn's sphinx moth than those found in Honua'ula, and contain a greater diversity of native plant species than Honua'ula.

~~When considered together with the other conservation measures identified for plants and wildlife (SWCA 2010a, 2010c), including an additional 121 36 acres of lands at Honua'ula where existing native plants are to be protected, enhanced, and propagated, the 22 40 acre Native Plant Preservation Area will make an important, valuable, and appropriate contribution to the long term viability of remnant mixed *kiawe wiliwili* shrubland associations in southeastern Maui. These conservation measures are subject to concurrence by the State DLNR, the USFWS, and the United States Corps of Engineers. The provision of the Native Plant Preservation Area easement is in conformance with County of Maui Ordinance No. 3554 Condition 27.~~

The scope of the Native Plant Preservation Area easement will be set forth in an agreement between Honua'ula Partners, LLC and the County of Maui (in conformance with County of Maui Ordinance No. 3554 Conditions 27a – 27d) that will include:

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- A commitment from Honua'ula Partners, LLC ~~to protect for the perpetual protection and preserve~~ preservation of the Native Plant Preservation Area for ~~the protection of~~ native Hawaiian dry shrubland plants and significant cultural sites worthy of preservation, restoration, and interpretation for public education and enrichment consistent with a Conservation Plan (see below) approved by the State DLNR, the United States Geological Survey, and the USFWS and with a Cultural Resource Preservation Plan (see Section 4.1 (Archaeological and Historic Resources) and Section 4.2 (Cultural Resources) for information on archaeological and cultural resources), which includes the management and maintenance of the Native Plant Preservation Area (Condition 27a);
- Confining use of the Native Plant Preservation Area to activities consistent with the purpose and intent of the Native Plant Preservation Area (Condition 27b);
- Prohibiting development in the Native Plant Preservation Area other than ~~erecting fences, enhancing and interpretive trails, and constructing structures for the maintenance needed for the area,~~ Interpretive trails will be minimal in size, and shall not consist of imported materials or hardened surfaces; care will be taken to minimize impacts to native plants during establishment of trails; and
- That title to the Native Plant Preservation Area will be held by Honua'ula Partners, LLC, its successors and permitted assigns, or conveyed to a land trust that holds other conservation easements. Access to the Native Plant Preservation Area will be permitted pursuant to an established schedule to organizations on Maui dedicated to the preservation of native plants to help restore and perpetuate native species, and to engage in needed research activities. These organizations may enter the Native Plant Preservation Area at reasonable times for cultural and education purposes only (Condition 27d).

~~In addition to the Native Plant Preservation Area, Honua'ula Partners, LLC will also provide additional areas for the protection of native plants (Figure 12). Altogether, 143 acres are proposed for the preservation, conservation, propagation, and management of native plant species at Honua'ula. Included in this area is the 22 acre Native Plant Preservation Area, which will contain the highest density of native and indigenous plants found at Honua'ula. The Native Plant Preservation Area and an additional 23 acres of Native Plant Conservation Areas within the *kiawe wiliwili* shrubland will remain ungraded and protected. Further areas specifically designated for native plants include approximately: 1) 53 acres of existing or enhanced natural landscape which may be graded but will be replanted with native dry shrubland species; 2) 28 acres of natural gulch areas; and 3) 17 acres for planting and propagation of native plants. Table 2 identifies conservation sub areas and the elements unique to each. Combined, these areas will: 1) provide protection for native plants; 2) ensure the long term genetic viability and survival of the native dry shrubland species; and 3) enhance long term population growth.~~

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Table 1. Honua'ula Native Plant Areas

Preservation & Conservation Designation	Approximate Area	Management Objective
Native Plant Preservation Area	22 acres	Easement protected in perpetuity and managed exclusively for preservation of the existing <i>kiawe-wiliwili</i> shrubland association
Native Plant Conservation Areas	23 acres	Ungraded conservation areas in which existing native plants will be protected and managed as natural areas
Naturalized Landscape (Existing and Enhanced)	53 acres	Areas for conservation of existing native vegetation
Natural Gulches	28 acres	Natural drainage gulches will be left undisturbed and existing native vegetation will remain intact
Out planting Areas for Native Plants	17 acres	Areas dedicated to the propagation of native plants
TOTAL AREA	143 acres	Native Plant Areas

Native Plant Conservation Areas – In addition to the Native Plant Preservation Area, Native Plant Conservation Areas will be located throughout the Property including adjacent to both the golf course and the Native Plant Preservation Area. The areas will include:

- All the existing natural gulches throughout the Property (28 acres);
- Ungraded conservation areas (eight acres) in which existing native plants will be protected and that will be managed as natural areas; and
- Areas containing naturalized landscape in which existing native vegetation will be conserved or enhanced through propagation of native species from seeds collected on the Property.

Combined these areas will add an additional conservation area of at least 36 acres in which existing native plants will be protected. Management strategies employed for these Plant Conservation Areas will be in accordance with the Conservation and Stewardship Plan.

Additional On-site Mitigation Measures – To further protect native species on-site, Honua'ula Partners, LLC will:

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- Conserve as many of the *wiliwili* trees as possible outside the Native Plant Preservation Area;
- Fence the entire perimeter of the Property, and other areas as appropriate, to exclude feral ungulates from the *kiawe-wiliwili* shrubland. A fence has already been erected, however fencing requirements will be reviewed and updated (for example, to include stronger deer fencing) as establishment of the Native Plant Preservation Area and site construction begins (this is consistent with County of Maui Ordinance No. 3554 Condition 7);
- Implement an ungulate management plan to ensure that goats, deer, pigs, and stray cattle are removed in a humane manner from the Native Plant Preservation Area and the Native Plant Conservation Areas (this is consistent with County of Maui Ordinance No. 3554 Condition 7);
- Employ a Natural Resources Manager to help develop and implement specific conservation programs to ensure the protection of native plants and animals within the Native Plant Preservation Area and ~~other~~ Native Plant Conservation Areas throughout the Property. The Natural Resources Manager will also be responsible for ensuring the success of the off-site mitigation program;
- Implement a program to control and eradicate invasive grasses, weeds, and other non-native plants from the Native Plant Preservation Area with the exception of the non-native tree tobacco (*Nicotiana glauca*), which is a recognized host plant for the endangered Blackburn's sphinx moth (*Manduca blackburni*) (for information on the Blackburn's sphinx moth see Section 3.7 (Wildlife Resources));
- Implement a native plant propagation program for landscaping with plants and seeds naturally occurring on the Property. All plants native to the geographic area will be considered as potential species for use in landscaping;
- Implement a seed predator control program to control rats, mice, and other seed predators;
- Implement a fire control program to help protect the Native Plant Preservation Area and the Native Plant Conservation Areas and ensure the success of plant propagation and conservation efforts;
- Implement an education and outreach program open to the public and sponsor service groups to assist with implementation of the management programs in the Native Plant Preservation Area and ~~other~~ Native Plant Conservation Areas;
- Apply for additional program support offered by the State of Hawai'i (Natural Area Partnership Program and Hawaii Forest Stewardship Program) and USFWS to promote sound management of the natural resources within Honua'ula;
- Submit copies of all SWCA reports prepared for Honua'ula, along with the report titled "*Remnant Wiliwili Forest Habitat at Wailea 670, Maui, Hawaii*" (Altenberg 2007), to DLNR, USFWS, U.S. Geological Survey, and U.S. Army Corps of Engineers for review and comment in compliance with County of Maui Ordinance No. 3554 Condition 27. These reports were submitted to the above agencies on March 22, 2010;
- Continue long-term vegetation monitoring during wet and dry seasons to evaluate the health of native plants and to support the development of the Conservation and

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Stewardship Plan for the Native Plant Preservation Area and ~~other~~ Native Plant Conservation Areas (~~see below~~); and

- ~~Prepare a multi-species~~ Finalize its draft Habitat Conservation Plan (to include the candidate endangered 'āwikiwiki) ~~under~~ in collaboration with USFWS and DLNR in accordance with Section 10(a)(1)(B) of the Endangered Species Act and in collaboration with DLNR and USFWS Chapter 195D, HRS. Section 3.7 (Wildlife Resources) below contains additional information regarding the Habitat Conservation Plan.

Off-Site Mitigation Areas

For off-site mitigation, Honua'ula Partners, LLC will:

1. Acquire a perpetual conservation easement of approximately 224-acres on a currently unprotected portion of property owned by Ulupalakua Ranch adjacent to the eastern boundary of the State of Hawaii Kanaio Natural Area Reserve; and
2. Fund and implement the continuation and expansion of restoration efforts within the Auwahi Forest Restoration Project area, just north of the Kanaio Natural Area Reserve, including fencing of approximately 130 acres, ungulate removal, and plant restoration activities.

Figure 12a shows the proposed locations of the on- and off-site mitigation areas. The on- and off-site mitigation measures and areas are subject to the approval of the Habitat Conservation Plan by USFWS and DLNR.

The Kanaio and Auwahi areas have been pinpointed by USFWS, USGS, Medeiros, Loope, and Chimera (1993), VanGelder and Conant (1998), Price et al (2007), and The Nature Conservancy to be of high value for Blackburn's sphinx moth habitat and native dryland forest and shrubland species including wiliwili and a number of threatened and endangered species. While it may be debated that there are additional areas in Southeast Maui with geology, slope, rainfall, and plant species composition similar to the Honua'ula Property, such areas are either already protected or simply not available for acquisition from their owners.

Kanaio Natural Area Reserve Conservation Easement – The proposed approximately 224-acre perpetual conservation easement adjacent to the eastern boundary of the Kanaio Natural Area Reserve harbors 171 species of plants, 40 percent of which are native to the Hawaiian Islands (19 indigenous species and 49 endemic species). In comparison, Honua'ula harbors 146 species of plants, of which 27 percent were native (26 indigenous species, and 14 endemic species).

This area, which contains native dry land habitat, is considered to be particularly high quality habitat for the Blackburn's sphinx moth, due in large part to the presence of many native host plants for both adult and juvenile life stages of the Blackburn's sphinx moth.

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As part of Honua'ula Partners, LLC's conservation efforts, the eight-foot ungulate fence that currently exists along the eastern and southern border of the approximately 224-acre area will be extended along the remaining borders of the parcel, and ungulates will be removed from the enclosure. A 10-foot wide fire break will be established along the inside perimeter of the fence to minimize the risk of fires started outside the parcel from entering the mitigation area. In addition, a cross fencing plan for adjacent ranch land is being developed in coordination with Ulupalakua Ranch. Cross fencing will be designed to facilitate cattle grazing in such a pattern to enhance fire control immediately adjacent to the protected area. The fence and fire breaks will be maintained in perpetuity.

Auwahi Forest Restoration – At the Auwahi Forest Restoration Project, Honua'ula Partners, LLC will fund and implement a 15-year restoration program covering an area of approximately 130-acres. This will include: a) fencing of, and ungulate removal from, approximately 130 acres of Blackburn's sphinx moth conservation area; and b) dry forest restoration to benefit the Blackburn's sphinx moth, and native dry shrubland plant species. Restoration activities will include removal of invasive weeds and propagation and out-planting of native species, including many native host plants for both adult and juvenile life stages of the Blackburn's sphinx moth.

While an eight foot fence already exists around the entire 184-acre Auwahi Forest Restoration Project, some cattle grazing continues in most of the area within the enclosure. As part of the program funded and implemented by Honua'ula Partners, LLC, cattle fences will be moved or installed and cattle will be removed from restoration areas.

Restoration efforts at the Auwahi Forest Restoration Project started in 1997 have been very successful, with 28 native species naturally reproducing after only 10 years of restoration efforts. The mitigation program implemented by Honua'ula Partners, LLC will build on this success, and will include mechanical and chemical removal of invasive plant species and enhancement of the native vegetation through propagation. A 10-foot wide fire break will be established along the inside perimeter of the fence, and the cross-fencing plan described above will benefit the Auwahi mitigation area as well as the Kanaio conservation easement area. Honua'ula Partners, LLC will establish an endowment to ensure that fences, firebreaks, and restored areas will be maintained in perpetuity.

Net Conservation Benefit

The proposed on- and off-site measures to protect native plants and Blackburn's sphinx moth habitat proposed by Honua'ula Partners, LLC provide a net conservation benefit (as required under Chapter 195D, HRS) through:

1. The protection and propagation of additional native host plants for both larval and adult Blackburn's sphinx moth (including the native host species 'aiea (*Nothocestrum spp.*) and halapepe (*Pleomele spp.*)); and

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2. Creation and protection of a higher number species of native host plants than currently exists on the Property.

The on- and off-site mitigation areas together provide approximately 394 acres of native dry shrublands for the perpetual protection and propagation of native dryland plants, including wiliwili. Through the perpetual protection and enhancement of these areas, a stable core habitat area will be secured for the moth, providing net benefit to this covered species, as well as a large number of additional native dryland species. To implement the on- and off-site mitigation measures Honua'ula Partners, LLC, will finalize its draft Habitat Conservation Plan (HCP) (See Section 3.7 (Wildlife Resources). The on- and off-site mitigation measures and areas are subject to the approval of the Habitat Conservation Plan by USFWS and DLNR. Section 3.7 (Wildlife Resources) below contains additional information regarding the Habitat Conservation Plan.

Honua'ula Conservation and Stewardship Plan

To ensure the long-term conservation and stewardship of native plants within Honua'ula, and in conformance with County of Maui Ordinance No. 3554 Condition 27a, SWCA prepared the *Honua'ula Conservation and Stewardship Plan* (2010b). The plan incorporates findings, conclusions, and recommendations from previous botanical surveys, wildlife surveys, and biological assessments of the Property and recommends proactive stewardship actions to manage the Native Plant Preservation Area and other Native Plant Conservation Areas.

The *Honua'ula Conservation and Stewardship Plan* also includes discussion of Hawaiian dry forest ecosystems and their status, an evaluation of the remnant coastal dry shrubland community at Honua'ula, an inventory of dry forest restoration efforts underway statewide (reserves and preserves), and an evaluation of lessons learned that are applicable to the Honua'ula Native Plant Preservation Area and other Native Plant Conservation Areas.

In summary, the remnant native vegetation in the Honua'ula mixed *kiawe-wiliwili* shrubland represents a highly degraded lowland dry shrubland. Current conservation efforts for native dry forest ecosystems have been focused on better examples of relatively intact ecosystems such as the Pu'u o Kali, Auwahi, and Kula Forest Reserves and the Kanaio and 'Āhihi-Kīna'u Natural Area Reserves. These projects and other conservation efforts in Hawai'i indicate that even small restoration efforts consisting of a few hectares, and in some cases individual trees, can help provide habitat for rare native dry forest species and can subsequently serve as urgently-needed sources of propagules.

With the lessons learned from other resource protection programs, the overall goal of the *Honua'ula Conservation and Stewardship Plan* is to ~~conserve the native plant resources of~~ protect native plants and animals within Honua'ula. The secondary goals are to cooperate with researchers in furthering the science of native plant propagation, and provide education and outreach opportunities, ~~and enhance the natural beauty of Honua'ula.~~ To

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achieve these goals the *Honua'ula Conservation and Stewardship Plan* sets forth management objectives, which are summarized below (SWCA 2010b). Many of these management objectives mirror the recommendations contained in the botanical survey (SWCA 2010a). Appendix F contains the complete *Honua'ula Conservation and Stewardship Plan*.

- **Management Objective 2: Fund and Hire a Natural Resources Manager**

A Natural Resources Manager will implement the goals and objectives of the *Honua'ula Conservation and Stewardship Plan*, which includes the *Ungulate Management Plan*. The Natural Resources Manager will be responsible for implementing the management objectives, including conducting public outreach, supporting plant propagation efforts and scientific research, and controlling and eradicating invasive plant species. The Natural Resources Manager will also work cooperatively with government and non-governmental conservation agencies including the Maui Invasive Species Council, Leeward Haleakalā Watershed Alliance, DLNR, and other organizations. The Natural Resources Manager will also be responsible for ensuring the success of the off-site mitigation program;

- **Management Objective 3: Eliminate Browsing, Grazing, and Trampling By Feral Ungulates**

The perimeter of the Property has already been fenced to exclude feral ungulates from the *kiawe-wiliwili* shrubland; however, the fencing is porous. In accordance with DLNR stipulations, the existing fence will be replaced with an ungulate proof fence to exclude non-native deer, goats, and cattle from damaging native plants. The fence is expected to be made of rust resistant, galvanized steel materials and will be approximately eight feet high with a mesh size of no more than six inches. Ungulates trapped within fenced areas will be removed from the Property in a humane manner. A detailed description of the fencing is contained in the *Ungulate Management Plan* which is appended to the *Honua'ula Conservation and Stewardship Plan*;

- **Management Objective 4: Remove and Manage Noxious Invasive Plants**

Honua'ula Partners, LLC will implement a program to control and eradicate invasive grasses, weeds, and other non-native plants from the Native Plant Preservation Area with the exception of the non-native tree tobacco (*Nicotiana glauca*), which is a recognized host plant for the endangered Blackburn's sphinx moth. In addition, the Natural Resources Manager will establish a protocol for avoiding the introduction of new invasive plants or the spread of existing plants. The Natural Resources Manager will also collaborate with the landscape designers for the golf course and the residential areas to ensure that the ornamental plants being used for landscaping are not likely to become invasive within the Native Plant Preservation Area or the Native Plant Conservation Areas;

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- **Management Objective 5: Protect and Augment All Native Plants Within the Native Plant Preservation Area**

In addition to building features or physical barriers (stone walls, fences, etc) to protect the Native Plant Preservation Area, Honua'ula Partners, LLC will augment existing native populations by seeding, out-planting nursery grown native plants, or transplanting native plants from un-protected areas on the Property. The Natural Resources Manager will implement a program to relocate scattered rare native plants occurring outside of the Native Plant Preservation Area (e.g. *nehe*) to appropriate areas within the boundaries of the Native Plant Preservation Area. The Natural Resources Manager will be responsible for improving habitat conditions, as needed, to augment the health of plants in the Native Plant Preservation Area and ~~other~~ Native Plant Conservation Areas;

- **Management Objective 6: Create a Plant Propagation Effort**

The Natural Resources Manager will work with native plant propagators in the community to facilitate a native plant propagation program. Selective seeds and cuttings will be collected from native plants found within Honua'ula to be stored outside the natural environment (i.e. seed banks) for use in plantings within the Property, as well as at protected areas such as Pu'u O Kali or the off-site mitigation areas. The success of this effort depends largely on the availability of fresh, viable seeds;

- **Management Objective 7: Attempt Propagation and Out-planting of Native Host Plants for the Blackburn Sphinx Moth**

Despite its importance to the endangered Blackburn's sphinx moth, the non-native tree tobacco (a Blackburn's sphinx moth host plant) is not an ideal species to maintain within the Native Plant Preservation Area because it is a high risk invasive species, due to its prolific seed production, environmental versatility, and toxicity to humans and cattle;

Because the intent of the Native Plant Preservation Area is to protect valuable native plant species, consideration is being given to propagating 'aiea (*Nothocestrum latifolium*) (a Blackburn's sphinx moth host native plant) in this area to replace the non-native tree tobacco. The ultimate outcome of this effort is unknown because the Property is at a lower elevation and drier climate than the elevation where native 'aiea usually grows. If 'aiea becomes established within the Native Plant Preservation Area and is used by the Blackburn sphinx moth, then non-native tobacco trees ~~will~~ may be removed. Removal of non-native tree tobacco will only occur in the season when Blackburn sphinx moths are underground. Precautions will be taken to ensure pupae are not harmed;

- **Management Objective 8: Protect Native Plants and Animals Against Wild Fires**

Honua'ula Partners, LLC will implement a fire control program to help protect the Native Plant Preservation Area and Native Plant Conservation Areas to insure the

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success of plant propagation and conservation efforts. This program will include the creation of a fire break immediately outside of the perimeter of the Native Plant Preservation Area. The golf course, which will abut portions of the Plant Preservation Area and other Native Plant Conservation Areas, will also act as a fire break to protect native plants. In addition, non-native grasses which augment fuel biomass, will be controlled from inside of the areas. The Natural Resources Manager will develop and finalize the fire control plan in coordination with resource agencies and fire department officials;

- **Management Objective 9: Remove and Manage Non-Native Seed Predators**
The Natural Resources Manager will design and implement a predator control program for rats, mice, and other predators within the Native Plant Preservation Area and the Native Plant Conservation Areas that prey on native plant seeds and seedlings. This program may include the use of bait stations, as well as traps. The program will be developed through coordination with USDA Animal Damage Control and DLNR staff. State DOH BMPs will be implemented;
- **Management Objective 10: Develop and Implement a Scientific Monitoring Program**
The Natural Resources Manager will work with the USFWS, DLNR, and others as appropriate to conduct a detailed scientific inventory and monitoring program. The purpose of the monitoring will be to: 1) establish an accurate baseline to evaluate the efficacy of management activities; 2) determine if the goals of the *Honua'ula Conservation and Stewardship Plan* are being achieved; and 3) identify impending threats to the Native Plant Preservation Area. This program will monitor annual survival rates, natural reproduction, signs of herbivory, abundance of invasive species, and accurately map native species, as appropriate;
- **Management Objective 11: Utilize Appropriate Native Plant Landscaping in Areas Outside the Native Plant Preservation Area and Native Plant Conservation Areas**
Honua'ula Partners, LLC will landscape common areas with native plant species to the maximum extent practicable. Preference will be given to xeric species (i.e. plants that require minimal irrigation and are tolerant of dry conditions); however, all plants native to the geographic area should be considered as potential species for use in landscaping. Honua'ula Partners, LLC will also conserve as many of the *wiliwili* trees as possible outside of the Native Plant Preservation Area and the Native Plant Conservation Areas;
- **Management Objective 12: Manage the Native Plant Preservation Area 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 Hawai'i, Maui Invasive Species Council, Leeward Haleakalā Watershed Alliance, State DLNR, and others, as appropriate, to

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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 Native Plant Preservation Area. Honua'ula Partners, LLC will make an effort to continually disseminate useful information to all stakeholders;

- **Management Objective 13: Develop a Public Education and Outreach Program**

Honua'ula Partners, LLC will implement an education and outreach program open to the local community and the general public. This program will be coordinated by the Natural Resources Manager and will involve: 1) sponsoring service trips to assist with management activities; 2) field trips for island students; and 3) developing interpretive signs to encourage public cooperation and discourage trespassing through the Native Plant Preservation Area and ~~other~~ Native Plant Conservation Areas; and

- **Management Objective 14: Incorporate Adaptive Management Principles**

To accommodate for uncertainty inherent in natural systems, Honua'ula Partners, LLC will adopt an active adaptive management approach. With this approach, information gathered during the monitoring program will influence and improve future management practices. According to USFWS policy, 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.

Honua'ula Landscape Master Plan

To ensure a cohesive and visually unified landscape throughout Honua'ula, PBR Hawaii and Associates, Inc, prepared the Honua'ula Landscape Master Plan. The Landscape Master Plan establishes an overall landscape concept and establishes principles to guide the design and implementation of landscape planting within Honua'ula. Key concepts and objectives of the Landscape Master Plan are summarized below. Appendix G contains the complete plan.

The design proposals contained in the Honua'ula Landscape Master Plan are driven by the *Honua'ula Conservation and Stewardship Plan* (SWCA 2010b), which recommends proactive stewardship actions to manage and propagate native plants within Honua'ula. Similarly, the Landscape Master Plan strives to create a naturalized landscape palette, using native plants, which require minimal irrigation and will, after establishment, require minimal maintenance. Consistent with the Maui County Planting Plan, the Honua'ula

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Landscape Master Plan is responsive to the botanical resources of the area and the need to limit the use of water for irrigation.

The goals of the Landscape Master Plan are to:

- Create an informal, naturalistic community-wide landscape that will allow buildings and other improvements to rest graciously upon the land; in this sense, the landscape will dominate the scene;
- Create a memorable experience at Honua'ula by designing landscapes that respect the site's natural and cultural resources, and embrace this unique Hawaiian landscape;
- Preserve, enhance, and protect native landscape and habitat areas by using native plants, whenever possible, to make seamless transitions between the natural landscape and introduced landscapes;
- Concentrate ornamental landscapes around key amenity areas of the Golf Clubhouse, mixed use village areas, and select higher density residential neighborhoods;
- Rehabilitate existing degraded landscapes and restore all disturbed areas affected by grading and construction for infrastructure and community development; and
- Use plants and irrigation techniques that are sensitive to water conservation.

The Honua'ula Landscape Master Plan draws inspiration from the geographical characteristics and native vegetation found on-site and in the area:

- **Native Plant Palette** – Honua'ula's primary plant palette will reflect the area's mixed *kiawe-wiliwili* shrubland vegetation. The vegetation will consist mainly of native drought-tolerant plants, which will be planted in a manner that will mimic how these plants would grow in their natural state. All planting areas will be irrigated using non-potable water.
- **Lava Flows** – Lava stone found on-site will be incorporated into the landscape as a thematic element. On-site rocks and boulders will be used for grade transitions and will also be incorporated as landscape features.
- **Lava Rock Walls** – Dry stack rock walls similar to the existing historic and ranch era walls found on-site will be incorporated into the landscape as both a functional and aesthetic design element. These walls will be incorporated throughout Honua'ula, becoming an important identity element of the Honua'ula landscape.
- **Gulches** – As much as possible, gulches will remain natural. Transition areas between gulches and built areas will incorporate boulders found on-site with native plantings.

The Honua'ula Landscape Master Plan identifies 13 key landscape areas or components that combine to create the framework for the overall landscape concept. Below is a listing of these areas along with the key design features of each:

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- **Entries/Gateways** – Define entries and gateways with boulders, rock walls, signs, canopy trees and/or vertical palms, specimen trees, native plants, and subtle lighting;
- **Roadways** – The landscape treatment along roadways and trails will consist primarily of informal clusters of native plants;
- **Pi'ilani Highway Extension** – With the exception of a few strategically located view corridors, most of the Pi'ilani Highway extension within Honua'ula will be planted with informal clusters of native and/or ornamental plants to create a dense buffer between the highway and adjacent uses;
- **Golf Course** – Native vegetation will be planted in informal clusters to transition from golf course landscaping to open spaces;
- **Clubhouse** – A combination of native plants, at the periphery or in low impact areas, and ornamental landscaping, close to the club buildings and in high impact areas, will create a varied yet naturalistic landscape;
- **Native Plant Preservation Area and Native Plant Conservation Areas** – Protection of existing native plants will be the primary objective for these areas;
- **'A'ā Lava Flows** – Lava and rocks will surround native plant clusters propagated from the site;
- **Grass Lands** – Native shrub vegetation will be use to landscape the area;
- **Maui Meadows Landscape Buffer** – A mixture of medium-sized canopy trees, large native shrubs, and small trees will function as a landscape buffer. In addition, portions of the buffer could be utilized for community parks and gardens;
- **Utility Buffers** – Canopy trees and dense understory plantings will surround water tanks and utility features to create a dense visual screen;
- **Gulches** – Re-established native plants will provide natural landscape treatment;
- **Parks** – Landscape will include turf grass, canopy trees, and native shrubs and groundcovers; and
- **Village** – Within the higher density village mixed use areas, a more ornamental landscape is appropriate, using canopy trees and shrub massing to mitigate the visual and micro-climate impacts of buildings.