3.6 BOTANICAL RESOURCES

Several botanical surveys of the Property have been conducted since 1988 (Char and Linney 1988; Char 1993, 2004; SWCA 2006; Altenberg 2007, and SWCA 2010a). In all, 146 plants species have been identified within the Property, 26 of which are native; 14 of these native species are endemic to Hawai'i. 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, *'āwikiwiki* (*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 have been no efforts by any Federal, State, or local government agency, or non-governmental conservation organizations to acquire and protect any portion of the Honua'ula Property. The non-native tree tobacco (*Nicotiana glauca*) has been found at various locations throughout the Property and often appears quickly following grading, mowing, or related land disturbances. While insignificant as an introduced weedy plant species, it 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)).

SWCA completed the most recent botanical survey of the Honua'ula Property in 2008 (SWCA 2010a). 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 survey of the areas of alternative wastewater transmission line alignments for possible connection to the Mākena Resort WWRF, which is located approximately one mile south of Honua'ula. The survey did not observe any Federal or State of Hawai'i listed threatened, endangered, or candidate plant species on any of the 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 see Section 4.8.2 (Wastewater System) and Figure 2 Appendix E contains the complete survey of the alternative wastewater transmission line alignments.

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, 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. 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, red natal) 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 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, *ʻāwikiwiki* (*Canavalia pubescens*), is considered to be a candidate endangered species by USFWS. Five *ʻāwikiwiki* 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 individuals (USFWS 2009). The USFWS has chosen 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). 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*), *ʻaʻaliʻi* shrubs (*Dodonaea viscosa*), *ʻiwaʻiwa* ferns (*Doryopteris decipiens*), *Pili* grass (*Heteropogon contortus*), Hawaiian moon flower vines (*Ipomoea tuboides*), *Wiliwili* trees (*Erythrina sandwicensis*) *naio* trees (*Myoporum sandwicense*), *kolomona* trees (*Senna gaudichaudii*); and *ʻānunu* vines (*Sicyos hispidus*).

The highest concentration of native plants occurs in the southern quarter of the Property, which is the area containing the *ʻaʻā* 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 *ʻaʻā* 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* Pic). 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.

POTENTIAL IMPACTS AND MITIGATION MEASURES

Honuaʻula will not impact any Federal or State of Hawaiʻi 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 will not impact any Federal or State of Hawaiʻi

listed threatened or endangered plant species, as none were identified on any of the alternative transmission line alignments.

To protect and conserve an area that contains the highest density of representative native plant species within Honuaʻula, including the five individual *ʻāwikiwiki* plants and numerous individual *nehe* plants found on the Property, Honuaʻula Partners, LLC will dedicate in perpetuity a conservation easement titled "Native Plant Preservation Area." 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).

As shown on Figure 1 and Figure 12, the proposed Native Plant Preservation Area is within the portion of the property south of latitude 20º40'15.00"N. It encompasses a contiguous 22-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 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 Laʻiʻopua on Hawaiʻi 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 there have been no efforts by any Federal, State, or local government agency, or non-governmental conservation organizations to acquire and 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 ʻAuwahi (10 acres) and Puʻu o Kali (236 acres) Forest Reserves and the Kanaio (876 acres) and ʻĀhihi-Kīnaʻu (1,238 acres) Natural Area Reserves (SWCA 2010b). In addition, over 12,000 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 than those found in Honuaʻula and contain a greater diversity of native plant species.

When considered together with the other conservation measures identified for plants and wildlife (SWCA 2010a, 2010c), including an additional 121 acres of lands at Honua'ula where existing native plants are to be protected, enhanced, and propagated, the 22-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:

- A commitment from Honua'ula Partners, LLC to protect and preserve the Native Plant Preservation Area for the protection of native Hawaiian 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 trails, and constructing structures for the maintenance needed for the area, in accordance with the Conservation/Preservation Plans (Condition 27c); 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.

Table 2. 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 *kiawe-wiliwili* 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**

To further protect native species, Honua'ula Partners, LLC will:

- 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 insure the protection of native plants and animals within the Native Plant Preservation Area and other Native Plant Areas throughout the Property;
- 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 in 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 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)*;*
- 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 Stewardship Plan for the Native Plant Preservation Area and other Native Plant Areas(see below); and
- Prepare a multi-species Habitat Conservation Plan (to include the candidate endangered *'āwikiwiki*) under Section 10(a)(1)(B) of the Endangered Species Act and in collaboration with DLNR and USFWS.

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 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 otherNative Plant 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 Honua'ula. The secondary goals are to cooperate with researchers in furthering the science of native plant propagation, provide education and outreach opportunities, and enhance the natural beauty of Honua'ula. To 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 1: Delineate the Boundaries of the Native Plant Preservation Area and Native Plant Conservation Areas**
  Before construction, the boundaries of the Native Plant Preservation Area and Native Plant Conservation Areas will be delineated with orange plastic construction fencing or similar material. This barrier will minimize trampling and damage to native plants during construction activities. Eventually, this fencing will be replaced with stone walls using materials from the Property to delineate the Native Plant Preservation Area and Native Plant Conservation Areas. In addition, a briefing will be conducted with construction personnel before construction activities to emphasize the importance of not entering the fenced areas;

- **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;

- **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;

- **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, outplanting 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 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. The success of this effort depends largely on the availability of fresh, viable seeds;

- **Management Objective 7: Attempt Propagation and Outplanting 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 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 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 Wildland Fires**
  Honua'ula Partners, LLC will implement a fire control program to help protect the Native Plant Areas to insure the 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 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 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 Areas; and

- **Management Objective 14: Incorporate Adaptive Management Principals**
  To accommodate for uncertainty inherit 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 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:

1. **Entries/Gateways** – Define entries and gateways with boulders, rock walls, signs, canopy trees and/or vertical palms, specimen trees, native plants, and subtle lighting;
2. **Roadways** – The landscape treatment along roadways and trails will consist primarily of informal clusters of native plants;
3. **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;
4. **Golf Course** – Native vegetation will be planted in informal clusters to transition from golf course landscaping to open spaces;
5. **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;

6. **Native Plant Preservation Area and Native Plant Conservation Areas** – Protection of existing native plants will be the primary objective for these areas;
7. **'A'ā Lava Flows** – Lava and rocks will surround native plant clusters propagated from the site;
8. **Grass Lands** – Native shrub vegetation will be use to landscape the area;
9. **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;
10. **Utility Buffers** – Canopy trees and dense understory plantings will surround water tanks and utility features to create a dense visual screen;
11. **Gulches** – Re-established native plants will provide natural landscape treatment;
12. **Parks** – Landscape will include turf grass, canopy trees, and native shrubs and groundcovers; and
13. **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.

3.7 WILDLIFE RESOURCES

Several wildlife surveys of the Property have been conducted since 1988 (Bruner 1988, 1993, and 2004; SWCA 2010c). SWCA completed the most recent wildlife survey of the Honua'ula Property in 2009 (SWCA 2010c). Specific objectives of the survey included: 1) documenting the presence and relative abundance of birds and mammals with the Property; and 2) determining the presence and abundance of any protected species within the Property, including migratory shorebirds, waterbirds, Federal and State of Hawaii listed endangered or threatened species, and "species of concern." Key findings of the SWCA survey are presented below. Appendix H contains the complete survey.

Endangered Species

Although not detected during previous surveys (Bruner 1988, 1993, and 2004), evidence of endangered Blackburn's sphinx moths (*Manduca blackburni*) was found within the Honua'ula Property during the SWCA (2010c) survey, including frass, cut stems and leaves, and live caterpillars. Evidence was limited to a single species of non-native weed: the tree tobacco (*Nicotiana glauca*). No adult Blackburn's sphinx moths were observed within the Property.

A single endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*) was sighted flying seaward over the Property near the southern boundary. No other bats were observed during the survey. *Kiawe* trees, which are abundant on the Property, have been documented as roost trees for the Hawaiian hoary bat, thus, while not observed, it is possible that Hawaiian hoary bats roost within the Property.

Native Birds

The endemic *pueo* (*Asio flammeus sandwichensis*) (short-eared owl) was the only native bird species observed within the Property. Six *pueo*, 12 barn owls, and six other unidentified owls were sighted in grassland habitat, but no owl nests were found. Grasslands present on the Property are likely to provide good foraging and nesting habitat for owls; however, ground nesting increases vulnerability to predation by rats (*Rattus* spp.), cats (*Felis catus*), and the small Indian mongoose (*Herpestes auropunctatus*), all of which are present in the area.

Native seabirds that may fly over the Honua'ula area during the day include the greater frigate bird or *'iwa* (*Fregata minor palmerstoni*) and tropic birds (*Phaethon* spp.). Native seabirds that may fly over the site at night include the endangered Hawaiian petrel (*Pterodroma sandwichensis*) and Newell's shearwater (*Puffinus auricularis newelli*). While seabirds may traverse the area, they do not nest on the Property.

Migratory Birds

A single non-native Northern harrier (*Circus cyaneus*) was observed flying over *wiliwili* trees in the southern portion of Honua'ula (SWCA 2010c). Pacific Golden-Plover or *Kōlea* (*Pluvialis fulva*) have been observed in the vicinity (Bruner 1988 and 2004); however, they were not seen during the course of the SWCA (2010c) survey.

Introduced Birds

SWCA biologists observed 16 species of introduced birds within the Property. The most abundant were: Japanese white-eye (*Zosterops japonicus*), nutmeg manikin (*Lonchura punctulata*), zebra dove (*Geopelia striata*) and northern cardinal (*Cardinalis cardinalis*). Also common were: African silverbills (*Lonchura cantans*) and red-crested cardinals (*Paroaria coronata*). Another survey (Bruner 2004) identified other common birds: house finch (*Carpodacus mexicanus*), black francolin (*Francolinus francolinus*), nutmeg mannikin (*Lonchura punctulata*), and northern cardinal (*Cardinalis cardinalis*).

Mammals

The Hawaiian Hoary Bat was the only native mammal observed during the SWCA (2010c) survey. Small herds of axis deer (*Axis axis*) were commonly seen. The small Indian mongoose (*Herpestes javanicus*) was observed, but was uncommon. Cats (*Felis catus*), rats (*Rattus spp.*) and mice (*Mus musculus*), while not observed, are expected to be present within the Property due to its proximity to the Maui Meadows subdivision and the Wailea Resort. While not present during the survey, domestic cattle (*Bos taurus*) are sometimes grazed in the northern portion of the Property.

POTENTIAL IMPACTS AND MITIGATION MEASURES

Honua'ula is not expected to significantly impact any endangered species. Evidence of the endangered Blackburn's sphinx moth (*Manduca blackburni*) was found within the Honua'ula Property and a single endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*) was sighted flying seaward over the Property. No other Federal or State of Hawai'i listed threatened or endangered animal species were identified on the Property. Several mitigation measures will be implemented to protect these endangered species and other animal species.

Endangered Species

While evidence of the Blackburn's sphinx moths (*Manduca blackburni*) was found within the Honua'ula property (frass, cut stems and leaves, and live caterpillars), no adult Blackburn's sphinx moths were observed. To protect Blackburn's sphinx moths, Honua'ula Partners, LLC will:

- Provide habitat for Blackburn sphinx moths within the Native Plant Preservation Area (see Section 3.6, Botanical Resources). While a preserve for native plants, the only non-native species that will be allowed to remain in this area will be the tree tobacco (*Nicotiana glauca*) so as to provide food and habitat for the moths. However, 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 native Blackburn's sphinx moth host 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 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 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;
- Remove non-native tree tobacco from the Property outside the Native Plant Preservation Area prior to construction. This will be done in consultation with biologists from DLNR and the USFWS to prevent accidental take of the Blackburn's sphinx moth caterpillar;
- Ensure against accidental take of Blackburn sphinx moths along the alternative transmission line alignments for possible connection to the Mākena Resort WWRF (see Section 4.8.2, Wastewater and Figure 2) by requiring a qualified wildlife biologist to screen any tree tobacco plants along the selected alignment for signs of moths (frass, cut stems or leaves, catipillers, pupae, or adults). If any evidence of moths is found, trees will be identified and protected against disturbance, and USFWS and the Maui DLNR office will be consulted;
- Monitor construction operations to prevent accidental take of the various Blackburn's sphinx moth life stages. Should moths be found, host plants will be

marked for protection and not removed until deemed appropriate by DLNR and USFWS biologists;
- Enact restrictions on landscaping and gardening within the completed Honua'ula community to prevent propagation of any plant in the Solenaceae (Night shade) family that may attract Blackburn's sphinx moths;
- Implement a translocation program in consultation with DLNR and the USFWS for Blackburn's sphinx moth caterpillars, particularly for caterpillars found in landscaped areas of Honua'ula; and
- Continue wildlife surveys from November to May during the Honua'ula construction period to look for signs of endangered Blackburn sphinx moths and protect individual moths from destruction.

A single endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*) was sighted flying seaward over the Property but no evidence of roosting or foraging was observed; however definitive conclusions about habitat use cannot be made based on existing evidence. The removal of *kiawe* trees during construction may result in the loss of roosting habitat, but many large stature trees suitable for roosting will be preserved and others will be propagated for landscaping. To further protect Hawaiian hoary bats, and in conformance with County of Maui Ordinance No. 3554 Condition 9, Honua'ula Partners, LLC will:

- Provide a qualified wildlife biologist to monitor for bats during construction. Should bats be found, assistance will be requested from the USFWS;
- Conduct additional bat point count surveys before construction to document any changes in abundance of bats and determine habitat utilization during the wet and dry seasons;
- Monitor clearing of habitat during construction to reduce the potential take of nonviolent juvenile bats; and
- Propagate native tree species for landscaping to provide suitable bat roosting habitat and mitigate for the loss of possible roosting trees during construction.

In addition to the above protection and mitigation measures, a multi-species Habitat Conservation Plan (to include the candidate endangered *'āwikiwiki*) will be prepard under Section 10(a)(1)(B) of the Endangered Species Act and in collaboration with DLNR and USFWS.

Native Birds

The endemic *pueo* (*Asio flammeus sandwichensis*) (short-eared owl) was the only native bird species observed within the Property, although no nests were found. Construction within what is currently grassland may potentially disturb roosting and nesting *pueo*. After construction, *pueo* may be permanently displaced from the Property due to the loss of grassland habitat. To minimize potential impacts to native *pueo*, and in conformance with County of Maui Ordinance No. 3554 Condition 9, Honua'ula Partners, LLC will:

- Conduct additional *pueo* surveys before construction to document any changes in abundance of *pueo* and habitat use during the wet and dry seasons; and
- Delay construction around any areas found to contain *pueo* nests until chicks have fledged.

Several species of native seabirds may traverse the area but they do not nest on the Property. To minimize potential impacts to native seabirds Honua'ula Partners, LLC will:

- Shield outdoor lights in compliance with Chapter 20.35 (Outdoor Lighting), MCC, avoid night-time construction, and provide all staff with information regarding seabird fallout.

After construction of the golf course, water features and open fairways may attract a number of endangered bird species that currently are not present. These may include *koloa* (*Anas wyvilliana*), *ae'o* (*Himantopus mexicanus knudseni*), *'alae ke'oke'o* (*Fulica alai*), *'alae 'ula* (*Gallinula chloropus sandvicensis*), and *nēnē* (*Branta sandvicensis*). In addition, there is the potential for lighting to attract threatened Newell's shearwater (*Puffinus auricularis newelli*) and endangered Hawaiian petrel (*Pterodroma sandwichensis*). The native migratory *kōlea,* which was not seen on the Property at the time of the SWCA (2010c) survey, frequently uses roads and open spaces when wintering in Hawai'i and may be displaced if construction occurs during the migratory season. However, it is anticipated that landscaped open spaces, gardens, and lawns and fairways on the Property will provide additional habitat that *kōlea* can use. To minimize potential impacts to other native birds Honua'ula Partners, LLC will:

- Shield outdoor lights in compliance with Chapter 20.35 (Outdoor Lighting), MCC, and avoid night-time construction; and
- Employ a Natural Resources Manager to help develop and implement specific conservation programs to insure the protection of native plants and animals within the Native Plant Preservation Area and other Native Plan Areas throughout the Property.

Mammals

Non-native mammals such as axis deer (*Axis axis*), mongoose (*Herpestes javanicus*), cats (*Felis catus*), rats (*Rattus spp.*) and mice (*Mus musculus*), pose a threat to native plant and animal species within Honua'ula. For example, feral ungulates are known to graze on native plants, degrade and destroy habitat, disrupt topsoil leading to erosion, and facilitate the establishment of non-native plants (SWCA 2010a). To control potential threats from non-native mammals and in conformance with County of Maui Ordinance No. 3554 Conditions 7 and 8, Honua'ula Partners, LLC will:

- Fence the 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 as the Native Plant Preservation Area and Native Plant Conservation Areas are established and site construction begins;

- Prepare and implement an Animal Management Plan, including 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. The Animal Management Plan will be prepared in cooperation with DLNR for submittal during Project District Phase II processing and approved by DLNR prior to submittal of Project District Phase Phase III processing;
- Inform owners within Honua'ula that the area is subject to the intrusion of mammals such as axis deer, pigs, rodents, and the impacts and management plan associated with such intrusions; and
- Employ a Natural Resources Manager to help develop and implement specific conservation programs to insure the protection of native plants and animals within the Native Plant Areas and other Native Plant Areas throughout the Property.

LEGEND

Native Plant Areas	Approximate Acreage
Native Plant Preservation Area (easement)	+/- 22ac.
Native Plant Conservation Areas	+/- 23ac.
Naturalized Landscape (Existing and/or Enhanced)	+/- 53ac.
Natural Gulches	+/- 28ac.
Outplanting Areas for Native Plants	+/- 17ac.
Sub-Total Native Plant Area:	+/- 143ac.
Total Preservation, Conservation, and Open Space:	**+/- 281ac.**

Open Space	Approximate Acreage
Golf Fairways	+/- 108ac.
Parks	+/- 6ac.
Landscape Buffers	+/- 24 ac.
Sub-Total Open Space Area:	+/- 138ac.

Miscellaneous
Lakes
Drainage/ Detention Basin

Preserved Archaeology
Historic Wall
Archaeological Sites

Disclaimer: This graphic has been prepared for general planning purposes only.

Plan By: VITA PLANNING & LANDSCAPE ARCHITECTURE

Figure 12

Native Plant Plan

Honua'ula

Honua'ula Partners, LLC

ISLAND OF MAUI

NORTH

LINEAR SCALE (FEET) 0 300 600 1,200

PBR HAWAII & ASSOCIATES, INC.