

Chapter 3



Description of the Natural Environment,
Potential Impacts & Mitigation Measures



3 DESCRIPTION OF THE NATURAL ENVIRONMENT, POTENTIAL IMPACTS, AND MITIGATION MEASURES

This section describes existing conditions of the physical or natural environment, preliminary potential impacts of Honua'ula, and preliminary mitigation measures to minimize any impacts.

3.1 CLIMATE

Honua'ula is located in one of the drier areas of Maui. The Kīhei-Mākena coast is generally, sunny, warm, and dry year-round. Annual temperatures in the region average from about 63°F to 86°F. Average rainfall distribution for the region varies from under 10 inches per year along the coastline to more than 20 inches per year in higher elevations. Rainfall in the Kīhei-Mākena region is highly seasonal, with most of the precipitation occurring during winter months (Maui County Data Book, ~~2008~~ 2010).

Northeast tradewinds prevail approximately 80 to 85 percent of the time. Tradewinds originating from the northeast average 10 to 15 miles per hour (mph) during afternoons, with slightly lighter winds during mornings and nights. Between October and April, the southerly winds of Kona storms may be experienced (Maui County Data Book, ~~2008~~ 2010)

POTENTIAL IMPACTS AND MITIGATION MEASURES

No significant impacts to the region's climate are anticipated. Modification of the Property's specific microclimate may occur from the planting of shade trees and other landscape elements.

3.2 GEOLOGY AND TOPOGRAPHY

The general geology of the Property is dominated by the Hāna Volcanic lava flows of the Kula Volcanic Series. More recent lava flows overlie the southern (approximately 170 acres) portion of the site. The Kula Volcanic Series is early Pleistocene in age. Hāna Volcanic lavas are late Pleistocene to recent lava flows, the last of which near the Property (La Perouse Bay) occurred around 1750. The lava flows are predominantly 'a'ā basaltic lavas inter-layered with clinker gravel.

Because of the relatively dry climatic conditions, weathering and erosion of the surface clinker and basalt on the Kula lava flows have resulted in the formation of only a thin layer of residual clayey and sandy gravelly silts. The residual soils normally overlie less weathered clinker and massive 'a'ā basalt. The clinkery material is generally unconsolidated and loose to medium dense in its natural condition. Exposures of massive 'a'ā basalt lava inter-bedded with clinker zones are visible along the side walls of several of the major gullies found in the upper portions of the site.

Because the Hāna lava flows are derived from younger volcanic eruptions than the Kula Series, less weathering and erosion of the surface clinker has taken place in areas with Hāna flows. Little to no soil cover is present over a major portion of the southern part of the Property.

The Property is crossed by numerous small ephemeral dry gulches that define drainage areas and convey on-site and off-site stormwater run-off during storms. Modifications to gulches are constrained by flood hazards and drainage improvements previously installed downstream within Wailea. The gulches are inundated infrequently during periods of unusually heavy and prolonged rainfall. ~~Because of the ephemeral nature of the gulches, Honua'ula Partners, LLC's biological consultant, SWCA Environmental Consultants, concludes that the gulches are not considered traditional navigable waters. The Department of the Army, United States Corps of Engineers has determined that the Property does not contain any navigable waters or other waters of the United States; therefore a Department of Army (DA) permit pursuant to Section 10 of the Rivers and Harbors Act of 1899 (Section 10) and Section 404 of the Clean Water Act (Section 404) is not required for any proposed or future work.~~

POTENTIAL IMPACTS AND MITIGATION MEASURES

Grading will be necessary to accommodate Honua'ula; however adverse impacts to topography and landforms are not anticipated. The topography is a key defining feature of Honua'ula, and one of the principal design and planning goals is to preserve and utilize this topography as much as possible. To the extent practicable, improvements will conform to the contours of the land to retain the existing rolling topography and natural drainageways and limit the need for extensive grading of the Property. Appropriate engineering, design, and construction measures will be undertaken to minimize potential erosion of soils during construction (see Section 3.4 below). All ground-altering activity will be conducted in accordance with Chapter 20.08, MCC (Soil Erosion and Sedimentation Control). Grading plans will attempt to balance excavation and embankment quantities to the extent practicable.

3.3 SOILS

There are three soil suitability studies prepared for lands in Hawai'i whose principal focus has been to describe the physical attributes of land and the relative productivity of different land types for agricultural production; these are: 1) the U.S. Department of Agriculture (USDA) Soil Conservation Service (SCS) Soil Survey; 2) the University of Hawai'i Land Study Bureau (LSB) Detailed Land Classification; and 3) the State Department of Agriculture's Agricultural Lands of Importance to the State of Hawai'i (ALISH).

3.3.1 USDA Soil Conservation Service Soil Survey

The USDA-SCS rated the on-site soils as generally unsuited for agricultural purposes, with low shrink/swell potential, low erodibility, good permeability, shallow depths to bedrock and fair to good suitability for road fill and other structural work. The USDA-SCS *Natural Resources Conservation Service, Soil Survey of the Islands of Kaua'i, O'ahu, Maui, Moloka'i, and Lāna'i* classifies the soils at the Property area into four soil types of two soils associations: Keawakapu-Mākena association and Kama'ole-Oanapuka association. The USDA-SCS designates the four on-site soil types as: 1) Oanapuka, very stony loam (OAD); 2) Very Stony Land (rVS); 3) Mākena Loam, stony complex (MXC); and 4) Keawakapu, extremely stony silty clay loam (KNXD) (Figure 8).

Mākena Loam, stony complex, 3 to 15 percent slopes (MXC) occurs on the lower leeward slopes of Haleakalā, between Mākena and Kama'ole. It consists of Mākena Loam and Stony Land. Stony Land occurs on low ridges and makes up 30 to 60 percent of the complex. Mākena Loam occurs as gently sloping areas between the low ridges of Stony Land. On the Mākena part of the complex, permeability is moderately slow, runoff is slow to medium, and the erosion hazard is slight to moderate. The available water capacity is about 1.8 inches per foot of soil. On the Stony Land part, permeability is very rapid and there is no erosion hazard. The Mākena part is in capability classification VIs, nonirrigated; the stony land part is in capability classification VIIs, nonirrigated.

Keawakapu, extremely stony silty clay loam (KNXD) occurs on low uplands. This soil series consists of well-drained, extremely stony soils. These soils developed in volcanic ash. Permeability is moderate. Runoff is slow to medium, and the erosion hazard is slight to moderate. Capability classification is VIs, nonirrigated.

Oanapuka very stony silt loam, 7 to 25 percent slopes (OAD) occurs on the lower uplands. This soil series consists of well-drained, very stony soils. These soils developed in volcanic ash and material derived from cinders. Permeability is moderately rapid. Runoff is slow, and the erosion hazard is slight to moderate. Capability classification is VIs, nonirrigated.

Very Stony Land (rVS) consists of young 'a'ā lava that has a thin covering of volcanic ash that locally extends deep into cracks and depressions. The slope ranges from 7 to 30 percent and occurs in very steep gulches. Capability classification is VIIs, nonirrigated.

In their comment letter on the Draft EIS dated June 1, 2010, the USDA Natural Resources Conservation Service stated:

- *In review of this project site location it was found that no Prime or other Important Farmlands exist. With this acknowledged there will not be any farmland conversion impacts to this site or the necessity to complete a Farmland Conversion Impact rating form (AD-1006).*

- The soil mapping does not identify any hydric soils in this project area. Hydric soils identify potential areas of wetlands.
- The soil reports [attached with the USDA-SCS Natural Resources Conservation Service letter, see Appendix AA] provide selected soil properties and interpretations: Dwellings without Basements, Local Roads and Streets, soil layers with USDA textures, and engineering classifications. The limitation ratings for Dwellings W/O Basements range from moderate to severe. These ratings do not preclude the intended land use, however they do identify potential limitations for the use, which may require corrective measures, increased costs, and/or continued maintenance.

3.3.2 LSB Detailed Land Classification

The LSB's *Detailed Land Classification, Island of Maui* (1965) classifies non-urban land by a five-class productivity rating system, using the letters A, B, C, D and E, where "A" represents the highest class of productivity and "E" the lowest.

The Detailed Land Classification, Island of Maui, prepared by the LSB, classifies the lands as "E" (Figure 9). The "E" classification signifies land that is very poorly suited for agriculture; it is the lowest productivity rating used by the LSB system.

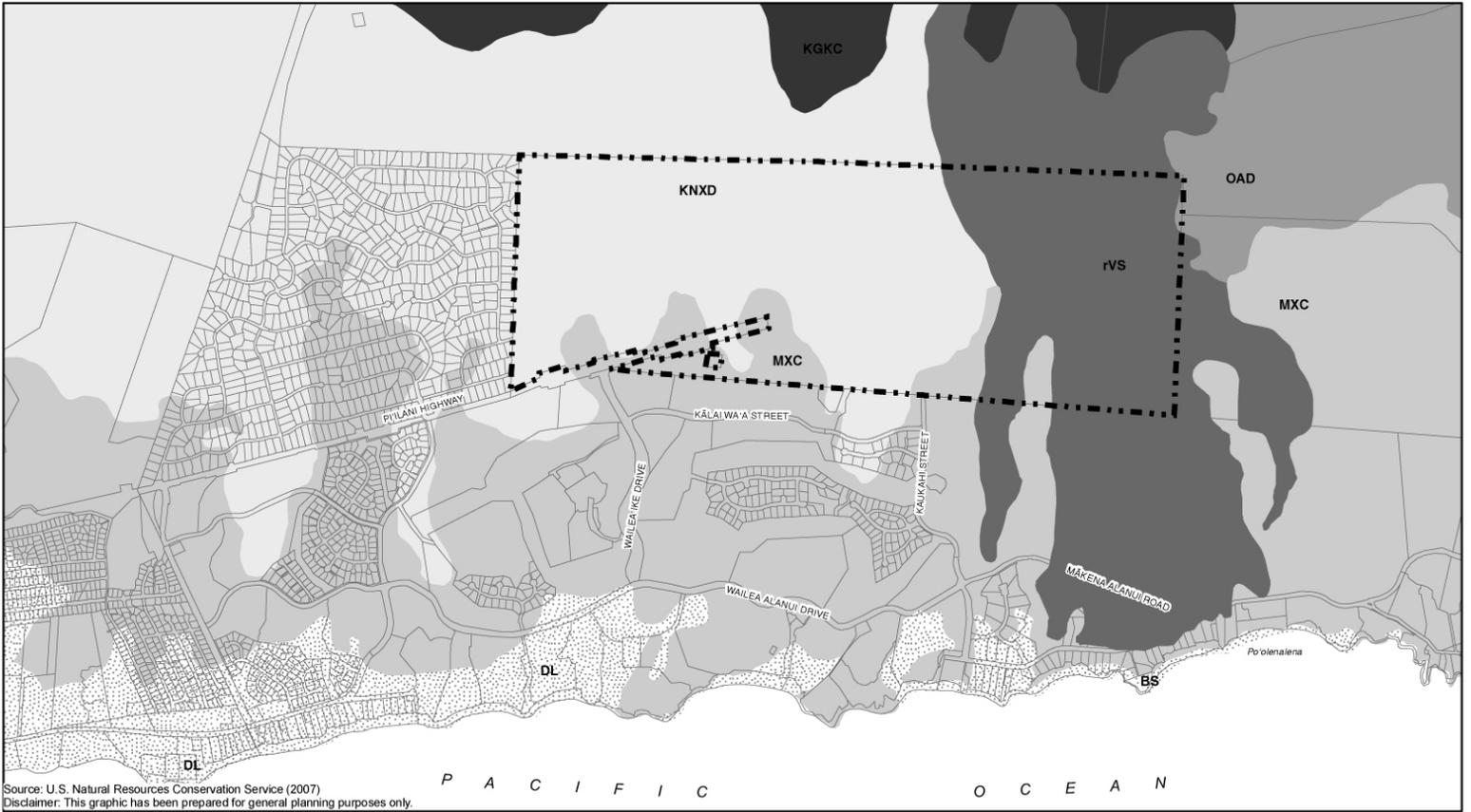
3.3.3 Agricultural Lands of Importance to the State of Hawai'i

The site is not classified under the State of Hawai'i Department of Agriculture's ALISH system (Figure 10). This means that soils at the site are not considered "prime agricultural land," "unique agricultural land," or "other important agricultural land."

POTENTIAL IMPACTS AND MITIGATION MEASURES

Honua'ula will not reduce the inventory of agriculturally significant lands. The Property has a SCS Land Capability classification of VI_s and VII_s, meaning it has very severe limitations because of stoniness or unfavorable texture. The soils are classified as: 1) very stony; 2) very rocky; 3) extremely stony; or 4) extremely rocky, and therefore would not be suitable for commercial plant growth or agriculture. The Property is rated "E" and unclassified on the LSB classification, and not classified under the ALISH system, indicating that the Property is not agriculturally significant.

The creation of Honua'ula will cause some land disturbance, including removal of existing vegetation (clearing and grubbing) and grading. Impacts to the soils include the potential for soil erosion and the generation of dust during construction. Clearing and grubbing activities will temporarily disturb the soil retention values of the existing vegetation and expose soils to erosional forces. Some wind erosion of soils could occur without a proper watering and re-grassing program. Heavy rainfall could also cause erosion of soils within disturbed areas of land.



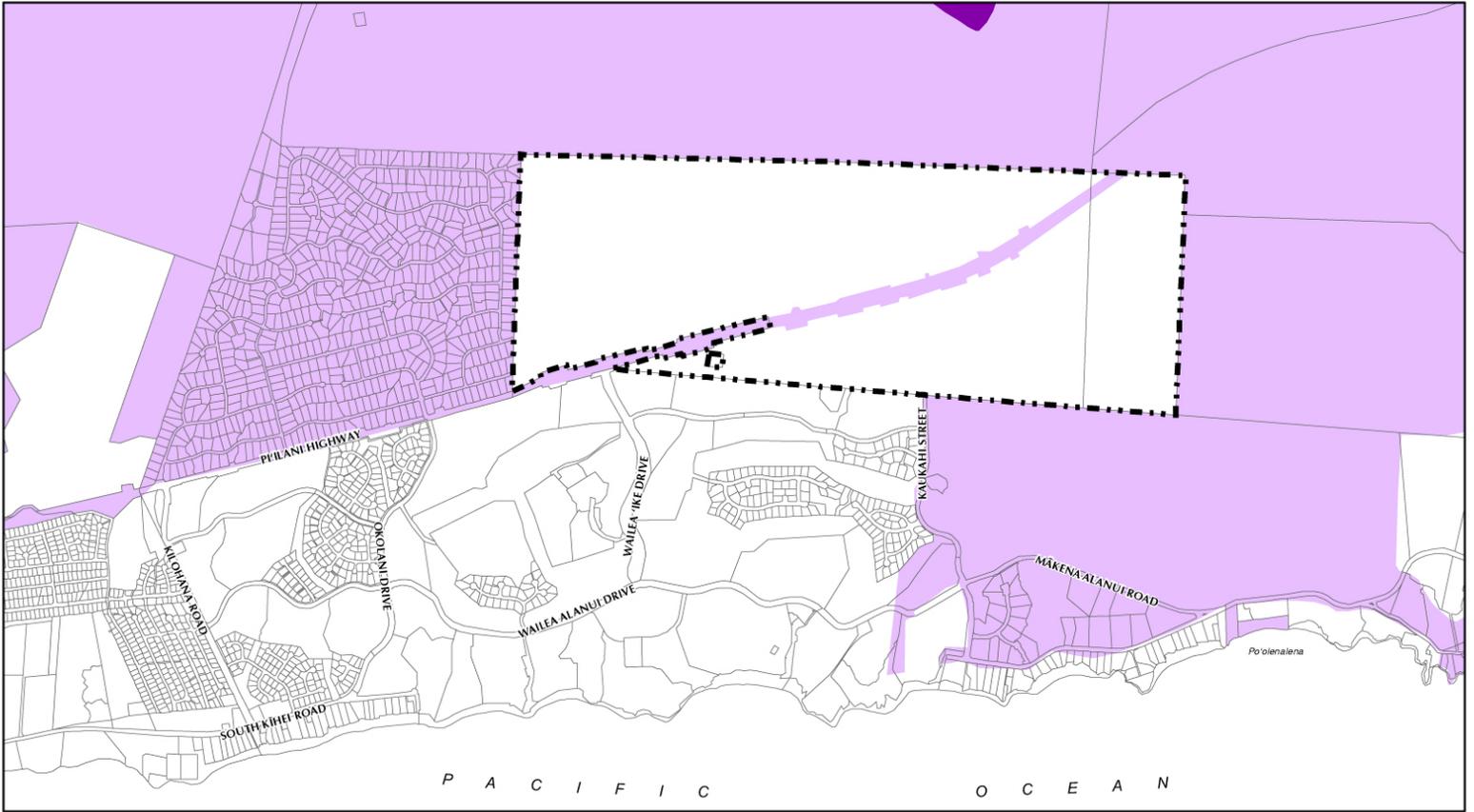
Source: U.S. Natural Resources Conservation Service (2007)
 Disclaimer: This graphic has been prepared for general planning purposes only.

LEGEND
 [Dashed Line] Honua'ula Boundary

- Soil Classification**
- [Dark Gray Box] rVS: Very stony land
 - [Black Box] KGKC: Kamaole extremely stony silt loam 3-15% slopes
 - [Light Gray Box] KNXD: Keawakapu extremely stony silty clay loam, 3-25% slopes
 - [Medium Gray Box] OAD: Oanapuka very stony silt loam, 7-25% slopes
 - [Dark Gray Box] MXC: Makena loam, stony complex 3-15% slopes
 - [Dotted Box] BS; DL: Sandy soils

Figure 8
 Soil Classification
 Honua'ula

Honua'ula Partners, LLC
 NORTH
 LINEAR SCALE (FEET)
 0 1,000 2,000 4,000
 ISLAND OF MAUI
 PBR HAWAII & ASSOCIATES, INC.



LEGEND

Honua'ula

Classification

- D: Poor
- E: Very Poor
- N: Not Classified

Figure 9

Detailed Land Classification

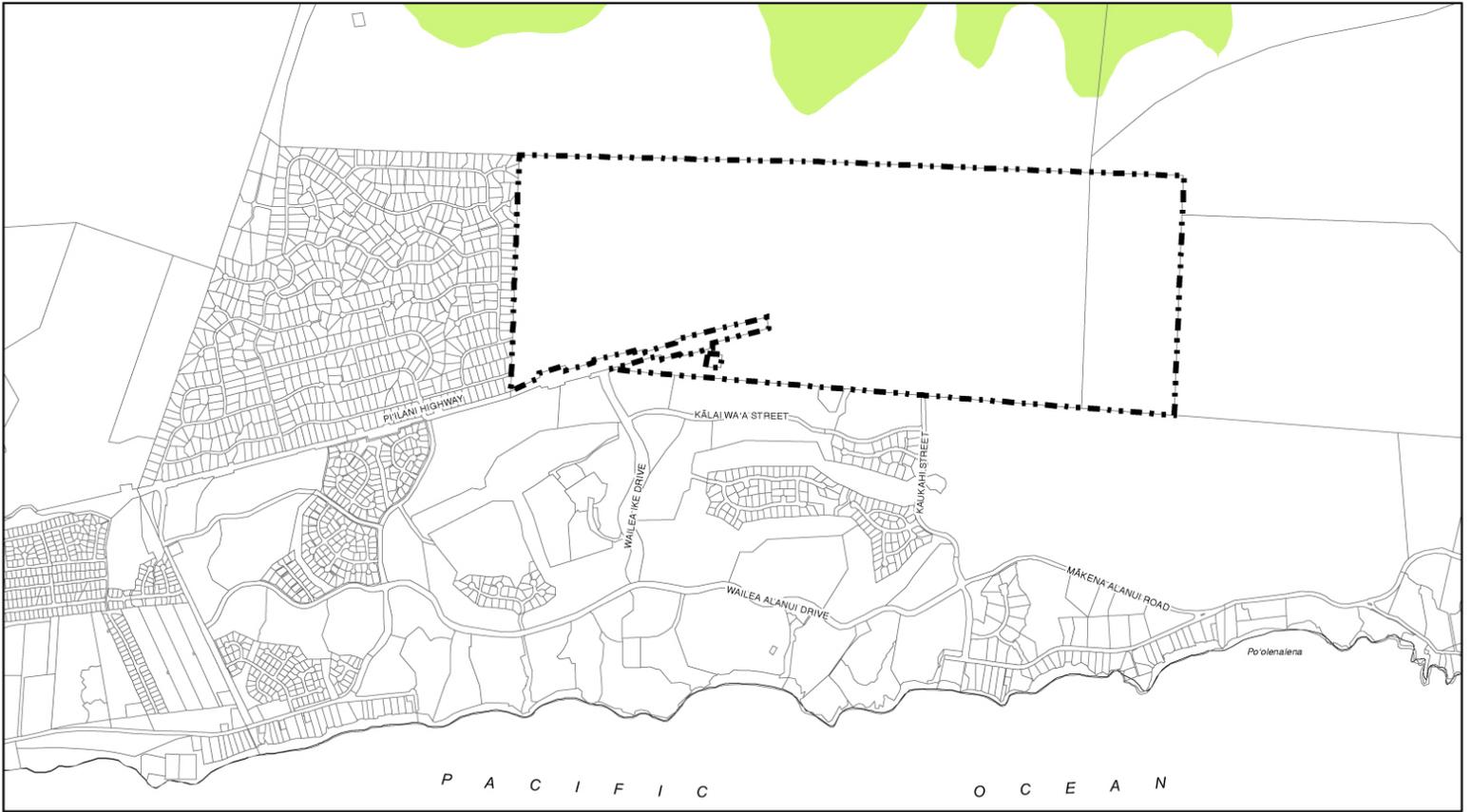
Honua'ula

Honua'ula Partners, LLC ISLAND OF MAUI

NORTH LINEAR SCALE (FEET)

PBR HAWAII & ASSOCIATES, INC.

Source: Office of Planning (1998)
 Disclaimer: This graphic has been prepared for general planning purposes only.



LEGEND

Honua'ula

ALISH Classification

- Other ALISH Land
- Unclassified Land

Figure 10
Agricultural Lands of Importance
to the State of Hawai'i (ALISH)

Honua'ula

Honua'ula Partners, LLC

NORTH

LINEAR SCALE (FEET)

0 1,000 2,000 4,000

ISLAND OF MAUI

PBR HAWAII & ASSOCIATES, INC.

Source: State of Hawaii Dept of Agriculture (1977)
Disclaimer: This graphic has been prepared for general planning purposes only.

All construction activities will comply with all applicable Federal, State, and County regulations and rules for erosion control. Appropriate engineering, design, and construction measures will be undertaken to minimize potential erosion due to grading of soils during construction. To minimize potential impacts, necessary grading will be segmented and exposed areas will be immediately grassed or landscaped before commencement of grading in the next phase, in compliance with Chapter 20.08, MCC (Soil Erosion and Sedimentation Control). Measures to control erosion during the site development period will include:

- Minimizing the time of construction;
- Retaining existing ground cover as long as possible;
- Constructing drainage control features early;
- Using temporary area sprinklers in non-active construction areas when ground cover is removed;
- Providing a water truck on site during the construction period to provide for immediate sprinkling, as needed;
- Using temporary berms and cut-off ditches, where needed, for control of erosion;
- Watering graded areas when construction activity for each day has ceased;
- Grassing or planting all cut and fill slopes immediately after grading work has been completed; and
- Installing silt screens, where appropriate.

As typically required for projects on land greater than one acre in size, a National Pollutant Discharge Elimination System (NPDES) Notice of General Permit Coverage for stormwater associated with construction activity will be necessary. Before issuance of a grading permit by the County of Maui, the final erosion control plan and Best Management Practices (BMPs) required for the NPDES permit will be completed and submitted. BMPs to minimize erosion and the discharge of other pollutants may include use of silt fences, sediment traps, and diversion swales. After construction, the establishment of permanent landscaping will provide long-term erosion control.

In complying with Chapter 20.08, MCC (Soil Erosion and Sedimentation Control) and the provisions of the NPDES permit, Honua'ula Partners, LLC will also be in compliance with County of Maui Ordinance No. 3554 (Condition 18i) which requires compliance with Condition 12 of the State DOH's "12 Conditions Applicable to All New Golf Course Development" concerning soil runoff during construction, consultation with the USDA-SCS, and obtaining a NPDES permit.

3.4 NATURAL HAZARDS

Maui is susceptible to potential natural hazards, such as flooding, tsunami inundation, hurricanes, earthquakes, and wildfires. The State of Hawai'i Department of Defense, Office of Civil Defense operates a system of civil defense sirens throughout the state to

alert the public of emergencies and natural hazards, particularly tsunamis and hurricanes. The closest siren to the Property is to the west and makai of Wailea Alanui Drive next to the Four Seasons Resort. Another existing siren is southwest of the Property on Mākena Road near the Wailea Golf Course. The range of these sirens does not reach to the area of the Property.

3.4.1 Flood

According to the revised Flood Insurance Rate Map (FIRM) dated September 25, 2009, prepared by the Federal Emergency Management Agency, National Flood Insurance Program, ~~a majority of the Property is located in Zone C X~~, which is outside of the 500-year flood plain in an area of minimal flooding (Figure 11). The National Flood Insurance Program does not regulate developments within Zone X.

3.4.2 Tsunami

Honua'ula is located outside of the tsunami inundation zone.

3.4.3 Hurricane

Records show that strong wind storms have struck all major islands in the Hawaiian Island chain since the beginning of history. The first officially recognized hurricane in Hawaiian waters was Hurricane Hiki in August of 1950. Since 1980, two hurricanes have had a devastating effect on Hawai'i: Hurricane 'Iwa in 1982 and Hurricane 'Iniki in 1992.

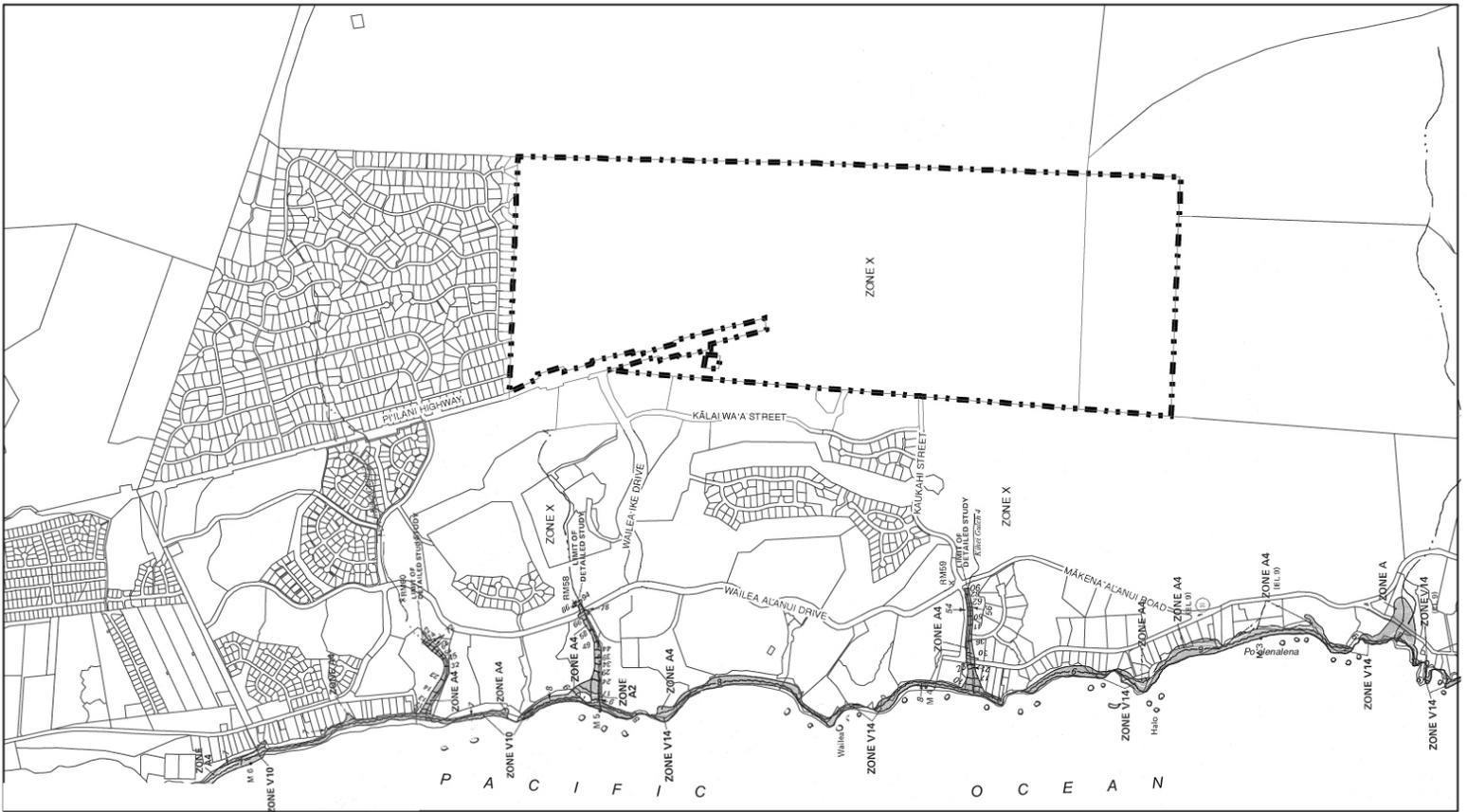
3.4.4 Earthquake

In Hawai'i, most earthquakes are linked to volcanic activity, unlike other areas where a shift in tectonic plates is the cause of an earthquake. Each year, thousands of earthquakes occur in Hawai'i, the vast majority of which are so small they are detectable only with highly sensitive instruments. However, moderate and disastrous earthquakes have occurred in the islands.

A ~~recent~~ series of earthquakes, with magnitudes of 6.7 and 6.0, occurred at Kīholo Bay (Hawai'i Island) on October 15, 2006. On Maui these earthquakes caused a closure of the Pa'ihi Bridge between Kīpahulu and Hāna, as well as a rockslide over the highway between Kīpahulu and Kaupō, cutting utility lines and undermining sections of the narrow roadway. The road between Kīpahulu and Kaupō was shut down in December 2006 and not re-opened until October 2008.

3.4.5 Wildfires

Currently, vegetation on the Property includes ~~kiawe/buffel grass~~ non-native buffel grass (*Cenchrus ciliaris*), non-native kiawe trees (*Prosopis pallida*), native wiliwili trees (*Erythrina sandwicensis*), and a dense understory of native 'ilima shrubs (*Sida fallax*).



LEGEND

Honua'ula

Zone Designations

- X** Areas determined to be outside the 0.2% annual chance flood (no shading)
- A1-A30** Areas of 100-year flood; base flood elevations and flood hazard factors determined
- V1-V30** Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.

Source: Federal Emergency Management Agency
 Panel 150003 0676, 0677, 0678, 0679 FIRM Index Date September 25, 2009
 Disclaimer: This map was prepared for general planning purposes only.

Figure 11
 Flood Insurance Rate Map
Honua'ula

Honua'ula Partners, LLC ISLAND OF MAUI
 NORTH LINEAR SCALE (FEET) 0 1,000 2,000 4,000

 PBR HAWAII & ASSOCIATES, INC.

~~Kiawe/buffel~~ Buffel grass, which is the most common grass on the Property, can easily carry fire.

Human carelessness is the number one cause of fires in Hawai'i. In Maui County the number of wildfires has increased from 118 in 2000 to 271 in 2003. Human error combined with the spread of non-native invasive grasses, shrubs, and trees, has led to an increased susceptibility to wildfires. According to Maui Fire Department data, Kīhei-Mākena's susceptibility of wildfire is high. Between 2005 and 2010 there were 201 wildfires in the Kīhei-Mākena area. The majority of those fires were of undetermined cause, 32 were caused by operating equipment, four were from a type of arch or flame, five were caused by fireworks, and five were from smoking materials. Approximately 2,180 acres were burned during this five-year period.

POTENTIAL IMPACTS AND MITIGATION MEASURES

The occurrence of natural hazards cannot be predicted, and should one occur, it could pose a risk to life and property. Honua'ula, however, will neither exacerbate any natural hazard conditions nor increase the Property's susceptibility or exposure to any natural hazards.

Due to its location and elevation, the probability of the Property being affected by flooding or tsunami is minimal. However, to protect against natural hazards, including earthquakes and wildfires, all structures at Honua'ula will be constructed in compliance with requirements of the Uniform Building Code (UBC), and other County, State, and Federal standards. Fire apparatus access roads and water supply for fire protection will be provided in compliance with the Uniform Fire Code.

The creation of Honua'ula will mitigate the potential for wildfires on the Property through its landscape design and plant palette. In large part, vegetative fuel for fires, such as non-native kiawe trees and buffel grass, will be replaced by buildings and landscaping of the community, thereby decreasing the Property's susceptibility to wildfires. Honua'ula Partners, LLC will implement a fire control program in coordination with the Maui County Department of Fire and Public Safety and resource agencies, which will include firebreaks to help protect native plant preservation and conservation areas (see Section 3.6, Botanical Resources) to insure the success of plant propagation and conservation efforts. Buffer areas between Honua'ula and Maui Meadows and along Pi'ilani Highway will also act as fire breaks, as will the golf course. Other fire mitigation measures include the use of lava rock and other non-flammable materials in building and landscaping, and creating a trail system, which will act as a fire break.

The USFWS recommends fire suppression resource response by fire engines and heavy equipment be within the first 45 minutes of fire ignition. The Maui Fire Department is responsible for fire suppression in the district. The fire station nearest Honua'ula is the newly built Wailea Fire Station located at the intersection of Kilohana Drive and Kapili Street between Pi'ilani Highway and South Kīhei Road, less than five minutes away. The

Wailea Station is approximately one half mile from the Property and is equipped with a 1,500 gallon per minute apparatus, a 95-foot mid-mount ladder truck and a 3,500 gallon water tanker truck. In addition, an emergency helipad and fuel dispensing station is located mauka of the fire station (see Section 4.10.3 (Fire) for information regarding fire control and response).

To help address the growing need for fire prevention and emergency services, in compliance with County of Maui Ordinance No. 3554 (Condition 24), Honua'ula Partners, LLC will provide the County with two acres of land that has direct access to the Pi'ilani Highway extension for the development of fire control facilities within the Honua'ula's Village Mixed-Use sub-district. This land will be donated at the time 50 percent of the total unit/lot count has received either a certificate of occupancy or final subdivision approval. The land provided will have roadway and full utility services provided to the parcel.

Impacts from natural hazards can be further mitigated by adherence to appropriate civil defense evacuation procedures. Honua'ula will coordinate with the State of Hawai'i Department of Defense, Office of Civil Defense and the County of Maui Civil Defense Agency regarding civil defense measures, such as sirens, necessary to serve Honua'ula.

3.5 GROUNDWATER RESOURCES AND WATER QUALITY

3.5.1 Groundwater

Tom Nance Water Resource Engineering (TNWRE) conducted an assessment of the potential impact on groundwater resources from the creation of Honua'ula. Information and conclusions from the assessment are summarized below. The complete assessment report is included in Appendix B. In response to a request from the Maui Planning Commission, TNWRE prepared a supplemental report which contains data for all wells in the Kama'ole Aquifer available from the CWRM. Information from this supplemental report is summarized below. The complete supplemental report is also included in Appendix B. In their letter commenting on the Draft EIS dated May 20, 2010, CWRM stated that the Draft EIS "thoughtfully discusses groundwater and surface water issues." The complete CWRM letter is included in Appendix AA.

The Property and the wells that will supply the Property are located in the Kama'ole Aquifer System. The system comprises a triangular-shaped area of approximately 89 square miles, with its apex at the top of Haleakala and its base along the 11-mile length of shoreline from Waiakoa Gulch on the north to Cape Kīna'u on the south. The Waiakoa Gulch boundary of the aquifer is coincident with the Wailuku-Makawao district boundary, but is otherwise of no known hydrologic significance. The southern boundary of the aquifer is the southwest rift zone of Haleakala, which is likely to be a barrier to groundwater flow. Groundwater in the Kama'ole Aquifer exists as a basal lens from the shoreline as far inland as the 1,700-foot contour. The direction of groundwater flow in the basal lens is mauka to makai.

The Property, located toward the western and southern end of the Kama'ole Aquifer, is generally semi-arid, with rainfall averaging about 18 inches per year. Because of the relatively dry conditions on and above the Property, there are no perennial streams on the Property or in the vicinity. Runoff occurs in the mauka-to-makai gulches which cross the Property only during, and for a short time following, intense rainfall events.

In 1990, the CWRM set the sustainable yield of the Kama'ole Aquifer at 11 million gallons per day (MGD). This was based on a computed groundwater recharge of 25 MGD and the assumption that 44 percent of the recharge could be withdrawn by wells without adversely impacting the integrity of aquifer. However, several far more detailed and sophisticated studies on the aquifer's recharge have been completed since then (USGS 1999; Waimea Water Services Inc. 2004; USGS 2007). These studies indicate that the recharge amount on which the CWRM's sustainable yield is based is substantially underestimated; the actual sustainable yield of the aquifer may be as much as 50 percent greater than the 1990 CWRM estimate. The most recent of these studies—which is considered to be the most reliable—estimates the groundwater flowrate to be 3.4 MGD per mile, which is the rate used by TNWRE in analyzing impacts to groundwater (TNWRE 2010a).

According to CWRM records, there are a total of 134 wells within the Kama'ole Aquifer System, many of which are more than 60 years old and no longer in use. Of the 134 wells, 43 are known or presumed to be in use, 47 are no longer in use or do not draw from the basal lens, and 44 are of unknown status relative to their use (TNWRE 2010b). Current actual aquifer pumpage is estimated to be approximately 4.0 MGD (TNWRE 2010a; TNWRE 2010b).

Examination of CWRM data shows that reporting of chlorides and water levels to CWRM is minimal. Only three of the 43 wells in the aquifer that are known or presumed to still be active are presently reporting this information. For wells for which TNWRE has independent data, chloride levels have been stable for a decade of monthly sampling.

No well has been drilled to sufficient depth through the basal lens to define the depth and character of transition zone anywhere in the aquifer. However, what is known or can be reasonably surmised regarding the transition zone is that:

- Groundwater levels along the 1,700-foot contour are approximately six feet above sea level; therefore, the midpoint of the transition zone below the 1,700-foot contour would be approximately 240 feet below sea level;
- Wells along or just below the 600-foot contour have water levels from 2.6 to 3.1 feet above sea level, indicating a midpoint of the transition zone below the 600-foot contour between 100 and 125 feet below sea level; and
- The stability of the transition zone, although not directly measured, can be inferred from the stability of chlorides pumped by wells. The most accurate and complete data of chlorides for the region shows stable chloride levels for a decade.

The Underground Injection Control Line², as established by the State DOH, is located approximately along the 600-foot elevation contour, above the majority of the Property.

Currently, Honua'ula has four brackish wells. Two of these are on the Property (Wailea 670 1 and 2). The other two are off-site (Kama'ole 1 and 2) in an area north of Maui Meadows and on land owned by Haleakalā Ranch. The total safe yield of the four wells, with one as standby, is 1.3 MGD (TNWRE 2010a). All of the wells are within the Kama'ole Aquifer System and are fully permitted by CWRM.

POTENTIAL IMPACTS AND MITIGATION MEASURES

Water Resources

Four aspects of Honua'ula have the potential to impact water resources: 1) use of groundwater for potable consumption and landscape irrigation; 2) generation, treatment, and reuse of domestic wastewater; 3) increase in surface water runoff; and 4) percolation of excess landscape irrigation to groundwater. Potential impacts to groundwater may occur in two geographically distinct areas: 1) beneath and downgradient of the Property itself; and 2) downgradient of Honua'ula's off-site wells.

Use of Groundwater – Honua'ula's potable and irrigation water supply will be provided by brackish wells. As noted above, four of these wells have already been developed: two are on the Property (Wailea 670 Wells 1 and 2); and the other two are off-site (Kama'ole Wells 1 and 2) in an area north of Maui Meadows. All of the wells are fully permitted by CWRM. Honua'ula's total average groundwater use at full build-out is projected to be approximately 1.7 MGD. To provide for summertime maximum use periods and to have standby capacity, two more wells will be needed. Depending on actual water use rates that materialize, a third new well may or may not be needed as Honua'ula approaches build-out. For more information on Honua'ula's water system, see Section 4.8.1 (Water System).

Honua'ula spans a 1.9-mile length of coastline mauka of the shoreline. Assuming a lateral dispersion on the order of 10 degrees, Honua'ula's potential impacts on groundwater may occur across a 2.3-mile section of the shoreline. The existing groundwater flowrate discharging into the marine environment in this area is estimated to be on the order of 7.8 MGD.

Five of Wailea Resort's nine golf course irrigation wells are within this downgradient and lateral zone. According to CWRM records, the draft of these wells is approximately 1.4 MGD as a year-round average. However, because Wailea Resort's Well 2 (No. 4126-02)

² Underground Injection Control Line (UIC) means the line on the DOH Underground Injection Control maps which separates exempted aquifers and underground sources of drinking water (Section 11-23-03, HAR).

is nearly directly downgradient from Honua'ula's on-site wells, it is the only well in which there may be a potential increase in salinity due to the potential decrease of groundwater flow being taken up by the on-site Honua'ula wells. Decreased pumping of Honua'ula's on-site wells would alleviate this potential impact.

Honua'ula's well system, with on-site and off-site wells, was specifically engineered to minimize impacts to Wailea Resort's golf course irrigation wells. Honua'ula's two on-site wells are fully permitted by CWRM and have been in place for nearly 20 years; however they cannot supply all water needed for Honua'ula. Rather than drill additional wells on-site, which could lead to potentially adverse impacts to Wailea Resort's downgradient wells, Honua'ula's off-site wells will draw from groundwater flows removed from Wailea Resort's wells, in an area north of Maui Meadows that has far less downgradient water withdrawals. The use of this off-site water within Honua'ula lessens the need for groundwater withdrawals from on-site Honua'ula wells, thus preserving more groundwater flow to the downgradient Wailea Resort wells.

Honua'ula's off-site wells, located north of Maui Meadows, and potential new wells in the same area, span an 0.8-mile long length at about the 580-foot elevation and have the potential to impact groundwater flow along an approximate 1.4-mile long shoreline segment. The existing groundwater flow rate discharging into the marine environment in this area is estimated to be on the order of 4.8 MGD. Use of Honua'ula's off-site wells is calculated to reduce this flow rate by approximately 27 percent.

Based on CWRM records, there are 20 wells in this downgradient and lateral zone. Most of these wells are more than 50 years old and are no longer in use. However, at least six are relatively recent (installed since the 1990s) and were developed to provide brackish landscape irrigation water for condominium parcels. The total draft of these wells is likely to be in the range of 0.12 to 0.30 MGD as a year round average. With the use of Honua'ula's off-site wells, the active downgradient irrigation wells may be impacted by a potential increase in salinity due to reduced flowrate, which current calculations indicate may be on the order of five percent. If the actual impact materially impairs the utility of the downgradient landscape irrigation wells, additional wells (pumping the same combined amount of water) in the area north of Maui Meadows to distribute the draft over a greater area would alleviate the impact so that the utility of downgradient wells is not materially impaired.

Wastewater Generation, Treatment, and Reuse – Two alternatives are being considered for treatment of Honua'ula's wastewater: 1) develop, maintain, and operate a private on-site WWRF; or 2) transport wastewater to the Mākena WWRF for treatment and return the treated effluent to Honua'ula for irrigation use. With either alternative, wastewater will be treated to R-1 quality and used for golf course irrigation. Potential impacts related to use of R-1 water for irrigation are discussed in the discussions below regarding percolation to groundwater and summary of impacts. For more information on Honua'ula's wastewater system see Section 4.8.2 (Wastewater System).

Collection and Detention of Rainfall Runoff – Honua'ula will use detention basins so that there will be no increase in the peak rate of stormwater runoff leaving the Property compared to existing conditions. Of the 18 inches of average annual rainfall received on the Property, it is assumed that one-third of the rainfall percolates to groundwater and the remaining two-thirds evaporates to the atmosphere or becomes runoff.

Runoff will be stored in 26 detention basins located on the Property in low lying areas, within the golf course, or along the makai Property boundary. Each of the detention basins will have a drainage outlet consisting, in part, of a vertical perforated pipe within a gravel mound which will act as a filter. In addition to reducing the peak runoff rate by detention storage, this configuration will also capture floatables and suspended solids in the basin, thus reducing sediments in the water released from the detention basins. With the use of detention basins, the peak rate of runoff leaving the Property will not increase over current conditions and seepage of water into the ground from the detention basins will actually increase the amount of percolation to groundwater. Potential impacts regarding percolation to groundwater are discussed below. For more information on Honua'ula's drainage system see Section 4.8.3 (Drainage System).

Percolation to Groundwater – Irrigation water used within Honua'ula will be a combination of: 1) brackish water from wells; 2) R-1 quality recycled water from the either the on-site WWRF or the Mākena WWRF; and 3) concentrate from reverse osmosis (RO) treatment of the potable supply.³

To calculate potential changes to groundwater, the groundwater assessment study made the following assumptions:

- The salinity of water from the brackish well water will be 0.95 parts per thousand (ppt);
- The R-1 water from the on-site WWRF or the Mākena WWRF will have 775 μM (micromoles)(10.85 milligrams per liter (mg/l) nitrogen and 165 μM (2.00 mg/l) phosphorus;
- Essentially all of the nitrogen and phosphorus in the brackish well water that is run through the RO treatment process will be contained in the concentrate that is used for irrigation;
- Rainwater percolating to groundwater will have an increase in nitrogen of 20 μM and an increase in phosphorus of 2.0 μM over existing conditions;
- Fertilizer applications in landscaped areas will be at three pounds per 1,000 square feet per year for nitrogen and at 0.5 pounds per 1,000 square feet per year for

³ Brackish well water will be treated by RO to produce potable water for Honua'ula. The RO process generates brine concentrate in the course of producing potable water. However, by diluting the brine water with other non-potable water (brackish and R-1), the salt content will be reduced to a degree that it can be used for irrigation, thus avoiding the use of injection wells to dispose of the brine. See Section 4.8.1 (Water System) for more details.

phosphorus; of these applications 10 percent of the applied nitrogen and two percent of the applied phosphorus will be carried in the percolate below the root zone.

- Percolation of excess applied irrigation water will occur from irrigating: 1) the golf course and driving range; 2) landscaping along roadways and in buffer areas; 3) parks and other landscaped public areas; and 4) residential parcels. It is assumed that 10 percent of the applied irrigation water on the golf course percolates to groundwater and 15 percent of applied irrigation water on other irrigated landscaped areas percolates to groundwater. At build-out, the total percolation to groundwater of excess applied irrigation is estimated to be 0.206 MGD.
- For all the irrigation water, it is assumed that the portion percolating through the root zone will have a salinity increase of 10 percent and a 50 percent reduction of nitrogen and phosphorus concentrations as a result of plant uptake and processes in the soil; and
- In the hundreds of feet of travel by the percolate through the vadose zone (the unsaturated lavas between the ground surface and groundwater) and the thousands of feet of travel for groundwater to discharge at the shoreline, natural processes will remove 80 percent of dissolved nitrogen and 95 percent of dissolved phosphorus.

The net potential change is calculated to be: a 2.9 percent reduction in flowrate; a 0.6 percent increase in salinity; a reduction in nitrogen loading of 4.3 percent; and a reduction in phosphorus of 4.8 percent.

The net decrease in nitrogen and phosphorus is due to several compounding reasons; 1) existing groundwater is already high in nitrogen and phosphorus due to naturally occurring processes upgradient of the Honua'ula wells; 2) pumping of the two on-site Honua'ula wells will thus decrease nitrogen and phosphorus in groundwater flowing to the ocean because of the reduced groundwater flow; 3) the total amount of groundwater withdrawn from the Honua'ula wells will not all percolate to groundwater, as some will be absorbed by plants, evaporate, or be captured as runoff in the detention basins; 4) for the water that does percolate to groundwater or flow from detention basins, natural processes will remove 80 percent of dissolved nitrogen and 95 percent of dissolved phosphorus in the hundreds of feet of travel by the percolate through the vadose zone (the unsaturated lavas between the ground surface and groundwater) and the thousands of feet of travel for groundwater to discharge at the shoreline.

Summary of Potential Impacts – Table 1 below presents a compilation of potential changes to groundwater in the area downgradient of Honua'ula after full build-out incorporating the assumptions noted in the previous discussions.

Table 1. Compilation of Potential Changes to Groundwater in the Area Downgradient of Honua'ula After Full Build-Out

Component Flow	Flowrate (MGD)	Salinity (PPT)	Nitrogen (lbs/day)	Phosphorus (lbs/day)
Pre-Development Groundwater	7.8	1.00	228.3	5.217
Withdrawal by On-site Wells (No. 4125-01 and -02)	0.43	0.95	12.59	0.288
Percolation From the Project Site to Groundwater				
• Percolating Rainfall	No Change	No Change	0.14	0.0077
• Percolation From the Golf Course				
• RO Concentrate	0.0203	2.651	0.170	0.0010
• WWRF Effluent	0.0274	0.440	0.248	0.0114
• Brackish Water	0.0240	1.045	0.070	0.0004
• Applied Fertilizer Dissolved in Percolate	--	--	0.788	0.0066
• Percolation From Other Landscaped Areas				
• Brackish Water	0.1336	1.045	0.391	0.0022
• Applied Fertilizer Dissolved in Percolate	--	--	0.981	0.0082
Post-Development Groundwater				
• Amounts	7.5753	1.0062	218.498	4.9665
• Change Compared to Pre-Development Flowrate	-2.9%	+0.62%	-4.3%	-4.8%

As shown on Table 1 the computed changes to groundwater in the area downgradient of Honua'ula are: 1) a relatively small 2.9 percent reduction in flow rate discharging into the marine environment; 2) a relatively insignificant 0.6 percent increase in salinity; 3) a reduction in nitrogen loading of 4.3 percent (a positive impact regarding ocean water quality); and 4) a reduction in phosphorus of 4.8 percent (a positive impact regarding ocean water quality). The largest factor contributing to these results is that most of the groundwater supply (about 75 percent) will come from the off-site Kama'ole wells; the use of this off-site water will: 1) lessen the need for groundwater withdrawals from on-site Honua'ula wells, thus preserving more groundwater flow to downgradient wells; and 2) contribute to groundwater recharge flowing toward the downgradient wells.

Based on these results, the hydrologic assessment concludes that the creation of Honua'ula will not impair Wailea Resort's golf course irrigation wells, with the possible exception of a salinity increase in Wailea Resort's Well 2 (No. 4126-02), which is directly downgradient of Honua'ula's two on-site wells. Decreased pumping of Honua'ula's on-site wells would alleviate this potential impact.

An estimated six active downgradient wells may be impacted by a potential increase in salinity due to reduced flowrate resulting from Honua'ula's off-site wells, which current calculations indicate may be on the order of five percent. These downgradient brackish wells were developed to provide landscape irrigation for individual condominium parcels, and the combined draft of all of these wells is relatively small (in the range of 0.12 to 0.30 MGD as a year round average). It is not known if the increase in salinity would materially

impair the utility of the wells; however if the utility of the wells is materially impaired, additional wells (pumping the same combined amount of water) in the area north of Maui Meadows would distribute the draft over a greater area and would alleviate the impact downgradient. Honua'ula Partners, LLC commits to distributing the draft over a greater area if the utility of active downgradient wells is demonstrated to be materially impaired.

In addition, Honua'ula Partners LLC will construct an upgradient golf course monitor well to a depth that will allow the well to also be used to monitor the transition zone below the basal lens; however available data from wells across the entire aquifer, and more specifically in the mauka-makai corridor that may be affected by Honua'ula's wells, does not indicate a monitor well is needed. Nonetheless, the monitor well will be installed prior to the start of use of Honua'ula's production wells and periodic profiling of salinity and temperature through the monitor well's water column will be performed. This data will be used to track salinity in the basal lens and the movement, if any, of the transition zone.

All existing on- and off-site wells are fully permitted by CWRM. All new wells will be developed in compliance with all requirements of Chapter 174C, HRS (State Water Code) and HAR, Chapters 13-167 to 13-171, as applicable, pertaining to CWRM and administration of the State Water Code. The CWRM application process for ~~water use permits entails: 1) the preparation of an extensive application that includes analysis of: a) the public interest; b) the rights of the Department of Hawaiian Home Lands; c) any interference with any existing legal uses; and d) alternatives; 2) a thorough public and agency review process; 3) public hearing(s); and 4) a formal decision from CWRM. Well well construction/pump installation permits also have~~ requires an extensive application process that includes with thorough review by the State Department of Health (DOH) for compliance with DOH rules and standards, including the appropriateness of the well location. Therefore, there will be extensive analysis, review, and evaluation of potential impacts of any new wells.

Cattle Ranching

Cattle ranching activities upslope of the Property and the off-site Honua'ula wells have very limited potential for contamination of Honua'ula's groundwater sources. The areas used for cattle ranching upslope of the Property are dry, hot, and un-irrigated; therefore cattle grazing in these areas is extensive, not intensive. The two- and 10-year zones of contribution would potentially cover the area from the 500-foot elevation (a short distance down slope from the highest point of the Property) to the 1,600-foot elevation (approximately 10,000 feet upslope of the Property). These elevations are the vertical travel distances for contaminants to reach groundwater. Substantial natural protection is provided by these distances as well as the multiple layers of successive lava flows, and therefore upslope cattle ranching activities are not expected to impact Honua'ula's groundwater sources.

Golf Course

To ensure that Honua'ula's golf course is developed and operated in an environmentally responsible manner and potential impacts to water resources are mitigated, Environmental & Turf Services, Inc., prepared a comprehensive Best Management Practices (BMPs) document adhering to the DOH's "Golf Course Best Management Practices" guidelines (DOH 2005). The BMPs also satisfy all previous DOH recommendations regarding golf courses, including, "Guidelines Applicable to Golf Courses in Hawaii" (Version 6, DOH 2002) and "Twelve Conditions Applicable to all New Golf Course Development" ("12 conditions;" Version 4, DOH 1992). The BMPs further satisfy specific conditions of County of Maui Ordinance No. 3554 that require compliance with several of the DOH's "12 Conditions." Sections of the BMP document relative to groundwater protection are summarized below. Appendix C contains the complete BMP document.

The overall goal of the Honua'ula BMPs is to reduce the turf chemical and water inputs required to manage the 18-hole golf course and to minimize waste generation. The most important BMP is the use of Seashore paspalum grass throughout the golf course. Traditionally, Hawaii golf courses have used bermudagrass, which presents an excellent playing surface under typical Hawaii conditions. However, the new varieties of Seashore paspalum rival bermudagrass in turf quality and have many additional environmental attributes, including tolerance of alternative water sources and high sodium and salt levels, the potential to substantially reduce fertilizer requirements (including a two-thirds reduction in nitrogen requirements) and minimal need for herbicides and fungicides.

Groundwater Monitoring – Two monitoring wells are tentatively proposed for installation on-site. An existing irrigation well will also be sampled. Baseline sampling and semi-annual operational phase sampling will be done. Analytes will include pesticides and relevant key metabolites, standard field parameters (such as pH and temperature), nitrate, phosphorus, and inorganic substances relevant to the ongoing nearshore monitoring program (see Section 3.5.2 (Nearshore Marine Environment)). A contingency plan is proposed that would trigger pesticide use restrictions or bans if pesticides are detected at predetermined concentrations. The groundwater monitoring program and protocol will be prepared in accordance with the DOH's Golf Course BMPs (DOH 2005) and will continue until DOH certifies that no further monitoring is required based on review of the data.

In providing and executing the groundwater monitoring program, Honua'ula Partners, LLC will also be in compliance with County of Maui Ordinance No. 3554:

- Condition 18a, which requires compliance with Condition 1 of DOH's "12 Conditions," which relates to establishing baseline groundwater/vadose zone and nearshore water quality (see Section 3.5.2 (Nearshore Marine Environment)) data and reporting findings to DOH; and
- Condition 18b, which requires compliance with Condition 2 and 3 of DOH's "12 Conditions;" specifically:

- Condition 2 of DOH's "12 Conditions" relates to establishing a groundwater monitoring program; and
- Condition 3 of DOH's "12 Conditions" requires immediate action if data from the monitoring system indicates increased levels of a contaminate that poses, or may pose, a threat to public health and the environment.

Water Conservation – Water conservation is central to the functioning of the golf course. While non-potable water will be used for all golf course irrigation, the golf course will also include a modern irrigation system designed to use non-potable water efficiently. The key component of the irrigation system will be a central computer to store information for every sprinkler, including the type of sprinkler, nozzle sizes, location, soil type, slope, infiltration, exposure, etc., so that the exact amount of water needed is applied (i.e., not just turning on sprinklers for a set duration). Cycle/soak features will prevent runoff when heavy irrigation is needed. Flow management features will ensure optimum pressure and amount to every sprinkler.

Records of irrigation procedures will be maintained for each management zone. Each management zone will be treated independently; the highest priority zones (greens, tees, fairways) will receive the highest amounts of water, while lower priority zones (secondary roughs, natural areas) will receive less water. These priority designations will help to efficiently manage overall water use on the golf course, providing the highest level of playability and aesthetics while incorporating water conservation and environmentally sustainable management practices.

In designing and implementing a detailed and efficient irrigation system, Honua'ula Partners, LLC will also be in compliance with County of Maui Ordinance No. 3554 Condition 18d, which requires compliance with Condition 5 of DOH's "12 Conditions," which relates to use of treated wastewater for golf course irrigation (see section 4.8.2 (Wastewater System) and the need for an irrigation plan.

Golf Course Maintenance Center – The golf course maintenance center is expected to be located near the Kaukahi Street entrance. It will be a modern, carefully designed, fenced and secured, state-of-the-art complex containing offices, a maintenance shop, and equipment and material storage. It will be designed to achieve these objectives: operational efficiency; worker health and safety; environmental protection (i.e., containment and management of chemicals and fuels so that the surrounding environment will not be impacted); and compliance with all Federal, State, and County regulations. The golf maintenance center is located in an area sufficiently distanced from residential uses and will be designed to further lessen noise to surrounding uses.

The maintenance center site will be graded, and curbs will be erected, so that parking lot drainage cannot flow directly into drainage features. Catch basins will capture contaminated stormwater runoff and any spills and will be tied to a drainage system that terminates in a treatment system to remove sediments, floating debris, and petroleum contaminants. The system will be designed with consideration that runoff from the

maintenance facility complex may include soil, sand, grass clippings, petroleum products (small amounts of oil and gasoline), fertilizers, and other typical hard surface runoff substances. There should be minimal to no presence of pesticides in runoff water due to the use of closed-loop recirculating systems and special containment pads.

The maintenance center will include a recycling wash water system for turfgrass equipment. The system will be capable of capturing grass clippings, oil and grease, and trace organics and will include a closed-loop wash/recycle wash-down water system independent of the stormwater drainage system.

Fuel storage will be within a split, above-ground fuel tank. One tank will be used for gasoline, and one for diesel. Both tanks will have double walls with vehicle barriers for accident prevention. The tanks will conform to the Uniform Fire Code and National Fire Protection Association regulations for above-ground tanks and will be designed to meet above-ground regulatory storage requirements in the State of Hawaii.

Pesticide/biocide storage will be in a pre-fabricated building specifically designed for pesticide storage to be ventilated, fire resistant, vapor explosion resistant, vandalism protected, spill self-contained, and climate controlled. The building will be designated and posted as a pesticide storage area (as required by law) with a list of all chemicals contained in storage on file in the superintendent's office. Fertilizer and other dry bulk material typically contained in bag form will be stored in a separate building with masonry walls to prevent corrosion caused by fertilizer salts.

A self-contained concrete mixing/loading pad, enclosed on three sides, will be designed to safely contain any spill, or emergency release of materials and prevent release of any chemicals or spray mix other than proper application to the turf.

Golf course maintenance equipment and vehicles used on-site will be stored in a paved area of the maintenance center. The floor of the equipment storage area will be hard surfaced, allowing easy clean-up of oil leaks, spills, or other fluids that might come from the equipment. Proper absorbent materials throughout the storage area will allow for quick clean up of spills. No fluids will be allowed to escape this area. Floor drains will not be allowed.

In providing a state-of-the-art golf course maintenance center, Honua'ula Partners, LLC will also be in compliance with County of Maui Ordinance No. 3554:

- Condition 18e, which requires compliance with Condition 6 of DOH's "12 Conditions," which relates to storage of petroleum products for fueling golf carts, maintenance vehicles, and emergency power generators that pose potential risk to groundwater;
- Condition 18f, which requires compliance with Conditions 7, 8, and 11 of DOH's "12 Conditions;" specifically:

- Condition 7 of DOH's "12 Conditions" relates to buildings designed to house fertilizers and biocides;
- Condition 8 of the DOH's "12 Conditions" relates to a golf course maintenance plan and program and is discussed below;
- Condition 11 of the DOH's "12 Conditions" relates to: 1) fugitive dust during construction, which is addressed in Section 4.6 (Air Quality) and 2) application of pesticides and chemicals, which is discussed below; and
- Condition 18g, which requires compliance with Condition 9 of DOH's "12 Conditions," which relates to minimizing noise from golf course maintenance activities.

Integrated Pest Management – Integrated Pest Management (IPM) is an interdisciplinary program that manages pest control tactics in a single system to prevent unacceptable levels of pest damage. IPM uses the least toxic control approach to address pest problems, using chemical controls only when other strategies are not effective. Appropriate control methods are generally not designed to eradicate pest populations but to manage turf grass in the most economical way with the least effect possible on people, property, and the environment.

The use of IPM avoids the conventional spray approach to pest management and is likely to reduce pesticide use by 30 percent or more. This approach ultimately develops hardier turf grass and increases the population of beneficial organisms and natural enemies to pests. Control tactics are implemented based on pest populations and not by spray intervals and calendar dates.

There is no single pest control method that provides complete control of turf grass pathogens (pathogens cause disease), but the multifaceted IPM approach provides the best and most economical control of pests. Golf courses, like other agricultural commodities, are susceptible to occasional attacks from a rather complex list of pests. These pests and causal agents may be observed during various climatic conditions and life cycles. They may be controlled by a variety of methods. With the IPM approach, pest populations are monitored such that an appropriate treatment is implemented when pest pressure exceeds the action tolerance level of damage to turf. A threshold is a level of damage or potential damage such as the number of insects or weeds per square foot of turf. The treatment may be one of a variety of pest control measures (e.g., mechanical removal, biorational products, chemical treatments, etc.). The IPM approach will work on every defined management area but must be tailored for each tee, green, fairway, and rough.

Monitoring control systems will provide the basis for developing thresholds and determining any actions necessary for control. The system should be simple, accurate, and part of the daily regimen for turfgrass management. Pests may be defined as bacteria, plant pathogenic fungi, insects, nematodes, rodents, viruses, weeds, etc. The information obtained through monitoring will provide site specific educational knowledge and limit the levels of predictable loss to turf grass. Pest occupancy is very weather-dependent;

therefore it is necessary to observe pest populations for several years to have a good idea about the range of pest problems.

A fertilizer/nutrient management plan will provide site-specific guidelines and plant requirements to maintain healthy turf grass, avoiding the over-application of nutrients resulting in transportation of dissolved nutrients off-site. Approximately half of the nitrogen fertilizer applied to turf grass is incorporated into the plant; the other half can be found stored in the soil and lost to the atmosphere. Thus there is limited fertilizer nitrogen remaining that can leach into ground water or be transported as runoff into surface water (Petrovic 1990; Cohen 1999). Golf courses can be managed so nitrogen from fertilizers does not contaminate ground water supplies (Petrovic 1990; Cohen 1999).

Biorational/organic products (fungi, bacteria, viruses, nematodes, and non-target insects) will be used whenever it is feasible, and there is a scientific basis to support their use. Biorational products can provide an effective and efficient method of eradicating disease and other pest pressures. Additional methods, such as applying composts containing microorganisms as top dressing and the use of compost teas may also suppress diseases before they harm turfed areas. EKO Compost, located in Pu'unēnē, manufactures and sells compost and compost-based mixtures. When applied as top dressing, EKO compost has been shown to improve yellowing areas on tees and fairways (Burgett 2006; EKO 2006).

Chemical treatments will only be used when a pest is present at significant levels to cause damage and should only be applied when the pest is most vulnerable to the pesticide (i.e., in juvenile stages of development) and when the environment is best suited to manage the application (e.g., not when soil is saturated, or during windy or rainy weather to prevent the amount of potential drift and surface water runoff). If the pest infestation is limited in scope, spot treatments may be possible. When applying chemical controls it is important that equipment is properly calibrated and adequately maintained. Pesticide will be rotated (alternative chemicals, or alternative pest control methods and cultivation controls) to reduce the possibility of pests becoming resistant to the applied chemicals, and also to reduce the frequency of chemical applications.

In implementing an Integrated Pest Management program, Honua'ula Partners, LLC will also be in compliance with County of Maui Ordinance No. 3554 Condition 18f, which requires compliance with Conditions 7, 8, and 11 of DOH's "12 Conditions;" specifically:

- Condition 7 of DOH's "12 Conditions" relates to buildings designed to house fertilizers and biocides and was discussed above;
- Condition 8 of DOH's "12 Conditions" relates to a golf course maintenance plan and program in regard to: 1) use of fertilizers and biocides which is discussed above; and 2) irrigation, which was discussed above;
- Condition 11 of DOH's "12 Conditions" relates, to 1) fugitive dust during construction which is addressed in Section 4.6 (Air Quality) and 2) application of pesticides and chemicals, which is discussed above.

3.5.2 Nearshore Marine Environment

Marine Water Quality

Although Honua'ula is not located along the shoreline, Marine Research Consultants, Inc., (MRC) conducted nearshore water quality monitoring studies in 2005, 2006, 2008, ~~and 2009, 2010, and 2011~~ specifically regarding Honua'ula to obtain pre-construction baseline data. The most recent study was conducted in ~~September 2009~~ March 2011. The nearshore water quality assessment ~~report~~ reports from 2010 (MRC 2010a) and 2011 (MRC 2011) ~~includes~~ include data from the previous Honua'ula studies, with particular emphasis on the most recent data. Information and conclusions from the ~~most recent assessment~~ 2010 (MRC 2010a) and 2011 (MRC 2011) reports, as well as other relevant information, are summarized below. Appendix D contains the complete 2010 assessment report included in the Draft EIS (MRC 2010a) and the most recent assessment report (MRC 2011).

The nearshore waters downstream of the Property, as are nearly all the waters along the west-facing shoreline of Maui, are classified as "A" by the State DOH. According to DOH water quality standards, "It is the objective of Class A waters that their use for recreational purposes and aesthetic enjoyment be protected." (HAR §11-54-03(c)(2)).

The *2006 State of Hawaii Water Quality Monitoring and Assessment Report*⁴ ("Integrated Report") (DOH 2008) lists two areas of nearshore receiving waters downstream from Honua'ula as "impaired," meaning State ocean water quality standards for specific criteria were not attained; specifically, state ocean water quality standards for open coastal waters were not attained at: 1) Ulua Beach Park for turbidity and chlorophyll a (Chl a); and 2) Wailea Beach Park for turbidity. Because these State ocean water quality standards were not attained, the Clean Water Act requires that Total Maximum Daily Loads (TMDLs)⁵ be established for the specific criteria that do not meet the standards. DOH is the State agency responsible for developing TMDLs; however DOH has not developed any TMDL criteria for any marine areas off the coast of Maui (DOH 2010). In addition, the Integrated Report states that at Ulua Beach Park and Wailea Beach Park there is a "low priority for initiating TMDL development with the current monitoring and assessment cycle (through April 15, 2008), based on the prioritization data established in the Integrated Report and on current and projected resource availability for completing the TMDL development process."

Data for the 2006 Integrated Report was collected in 2006 and before. The current Honua'ula nearshore water quality monitoring study (MRC ~~2010a~~ 2011) included water

⁴ The complete title is: *2006 State of Hawaii Water Quality Monitoring and Assessment Report: Integrated Report to the U.S. Environmental Protection Agency and the U.S. Congress Pursuant to Sections §303(D) and §305(B), Clean Water Act (P.L. 97-117)*. The report was prepared by the Hawaii State Department of Health and is dated January 11, 2008.

⁵ A Total Maximum Daily Load, or TMDL, is a calculation of the maximum amount of a pollutant that a waterbody can receive and still safely meet water quality standards (<http://www.epa.gov/OWOW/tmdl/>).

quality sampling from the same locations downstream from Honua'ula as the 2006 Integrated Report (see below regarding sampling locations). In contrast to the 2006 Integrated Report results, the results of the current nearshore water quality monitoring study do not show turbidity levels that exceed DOH standards at either Uluā Beach Park or Wailea Beach Park (MRC 2010a). Current measured levels of chlorophyll a (Chl a) at these locations do exceed DOH standards; however it should be noted that measures of chlorophyll a (Chl a) exceeded DOH standards at all sampling sites, including the control site off the 'Āhihi-Kīna'u Natural Area Reserve, indicating that the exceedance of chlorophyll a (Chl a) is not the result of input from land. At the time the Draft EIS was prepared (March 2010) DOH anticipates anticapted publishing an update of the 2006 Integrated Report in 2010; however, as of May 2012 an updated report was not published.

Comparison of data from the 2006 Integrated Report and the current Honua'ula nearshore water quality monitoring study (MRC ~~2010a~~ 2011) shows that water quality results can vary over time. It is important to note that Honua'ula is not yet built, so any current exceedances of State water quality standards are not the result of Honua'ula. The purpose of the Honua'ula nearshore water quality monitoring studies is to establish baseline water quality data regarding existing conditions without Honua'ula. Honua'ula water quality monitoring studies will continue during construction and after Honua'ula is built, so that any changes can be compared to the the baseline data to determine if Honua'ula has an impact on water quality. If there is an impact from Honua'ula, corrective actions will be taken.

For each of the Honua'ula nearshore water quality monitoring studies, sixty ocean water samples were collected in accordance with DOH water quality standards on four transects spaced along the length of coastline makai of and downstream from Honua'ula and one transect located outside of the downstream area as a control, as follows:

- Site 1 – Off the southern boundary of Wailea Resort Gold Golf Course;
- Site 2 – Off the southern end of Palauea Beach downstream from the southern Property boundary;
- Site 3 – Off the southern end of Wailea Beach downstream from the center of the Property;
- Site 4 – Off the northern end of Uluā Beach downstream from the northern Property boundary; and
- Site 5 (control) – Off the 'Āhihi-Kīna'u Natural Area Reserve approximately two miles south of the Property.

For all transects, ocean water samples were collected at five locations along each transect extending from the highest wash of the waves to approximately 150 meters offshore. This sampling scheme spans the greatest range of salinity with respect to groundwater/surface water flowing out from the shoreline. Sampling was more concentrated in the nearshore zone because this area is most likely to show the effects of shoreline modification. With the exception of the two locations closest to the shoreline, which are in shallow waters,

samples were collected at two depths; a surface sample within approximately 10 centimeters of the ocean surface, and a bottom sample collected within one meter of the ocean floor.

In addition to ocean water samples, water samples were collected from seven irrigation wells and a golf course reservoir in the Wailea area upslope of the ocean water sampling area to provide data on composition of groundwater flowing under the Property. This data has been incorporated into the findings of the study of assessment of the potential impact on groundwater resources (TNWRE 2010a) discussed in Section 3.5.1 (Groundwater).

Ocean water samples were analyzed for water quality criteria specified by DOH water quality standards for Class A open coastal waters (Section 11-54-06, HAR), as well as several additional criteria. These criteria include: total nitrogen (TN), which is defined as inorganic nitrogen plus dissolved organic nitrogen; nitrate + nitrite nitrogen (NO_3^-); ammonium (NH_4^+); total phosphorus (TN), which is defined as inorganic phosphorus plus dissolved organic phosphorus; chlorophyll a (Chl a), turbidity, temperature, pH, and salinity. In addition, orthophosphate phosphorus (PO_4^{3-}) (an indicator of biological activity) and silica (Si) (an indicator of the degree of groundwater mixing) were reported.

The results of the 2011 assessment of marine water chemistry (MRC 2011) are summarized below.

- Water chemistry constituents that occur in high concentration in groundwater (silica (Si), nitrate + nitrite nitrogen (NO_3^-), and total nitrogen (TN)) typically displayed steeply sloping horizontal gradients with highest concentrations nearest to shore and decreasing concentrations moving seaward; meaning the highest concentrations of these constituents occur near the shore and decrease with distance from the shoreline. Salinity showed the opposite trend, with lowest values closest to shore, and increasing values with distance seaward; meaning salinity increases with distance from the shore. Gradients were steepest within 10 meters of the shoreline, ~~but often continued across the entire length of all transects and generally extended 50 to 100 meters offshore. The steep nearshore gradients had the greatest magnitude of constituents (i.e., highest concentrations at the shoreline) at Sites 1 and 2. The steepest nearshore gradients, indicating the highest input of groundwater at the shoreline, occurred at Site 1, while the weakest gradients occurred at Sites 2 and Site 5.~~ The steep horizontal gradients signify mixing of low salinity/high nutrient groundwater that discharges to the ocean at the shoreline and high salinity/low nutrient ocean water further from shore.
- Vertical stratification (layering) of the water column was clearly evident at all sites for the chemical constituents that occur in high concentrations in groundwater relative to ocean water. Vertical stratification indicates that physical mixing processes generated by wind, waves, and currents were often not sufficient to completely break down the density differences between the buoyant low salinity surface layer and denser underlying water.

- ~~Most water~~ Water chemistry constituents that do not occur in high concentrations in groundwater (ammonium (NH₄⁺), dissolved organic phosphorus (TOP), dissolved organic nitrogen (TON), chlorophyll a (Chl a), turbidity) did not display distinct horizontal or vertical trends.
- Scaling nutrient concentrations to salinity indicates that during the ~~September 2009~~ March 2011 survey there was no apparent subsidy of nitrate + nitrate nitrogen (NO₃⁻) from human activities on land to the nearshore ocean at any of the sites. During previous surveys, substantial subsidies of nitrate + nitrate nitrogen (NO₃⁻) at some locations had been evident. The likely cause of the subsidies of nitrate + nitrate nitrogen (NO₃⁻) in past surveys was either leaching of golf course or landscaping fertilizers to groundwater that flows under the Wailea golf courses, or possibly leakage from old septic systems or cesspools that served residences in the vicinity of Site 1. Such subsidies were not evident in the 2011 monitoring survey.
- Comparing water chemistry parameters to DOH standards revealed numerous measurements of nitrate + nitrate nitrogen (NO₃⁻) that exceeded the DOH “not to exceed more than 10 percent of the time” criteria for open coastal waters. Numerous values of nitrate + nitrate nitrogen (NO₃⁻), ammonium (NH₄⁺), total nitrogen (TN), chlorophyll a (Chl a), and to a lesser extent total phosphorus (TP), and turbidity, exceeded specified limits for geometric means. Such exceedances occurred at all survey sites, including the control site (Site 5) which is not influenced by the golf courses or other large-scale land uses. These results indicate that the exceedances of the geometric mean water quality standards are not solely associated with golf course operation or other anthropogenic land uses. Rather, natural groundwater discharge (which contains elevated nutrient concentrations relative to open coastal water) can cause water chemistry characteristics to exceed DOH standards, which do not include consideration of such natural factors.
- Comparison of survey results from the nearshore water quality monitoring assessments from 2005, 2006, 2008, ~~and 2009,~~ 2010, and 2011 reveals that there are no statistically significant increases or decreases in the concentrations of nutrients at any of the survey sites. This indicates that there has been no consistent change in nutrient input from land to groundwater that enters the ocean from 2005 to ~~2009~~ 2011.

Marine Environment

Although Honua'ula is not located along the shoreline, MRC conducted ~~a preliminary~~ an assessment of the marine community structure of the nearshore waters downstream from the Property (MRC 2010b). The assessment describes the results of a baseline survey of the nearshore marine communities to provide a basis for estimating alteration of community structure as a result of modifying land uses mauka of the shoreline. Information and conclusions from the marine community structure assessment report are summarized below. Appendix D contains the complete report.

Marine community structure can be defined as the abundance, diversity, and distribution of stony and soft corals, motile benthos such as echinoderms, and pelagic species such as reef fish. It is important to note that while no work has been initiated for Honua'ula, the Property is separated from the ocean by the Wailea Resort, which has been in existence for several decades. Hence, marine communities downslope from Honua'ula have been influenced by land uses of the Wailea Resort, and do not represent "pristine" conditions.

For the assessment, the biotic structure of benthic (bottom-dwelling) communities inhabiting the reef environment was evaluated by establishing a descriptive and quantitative baseline between the shoreline and the 20 meter (~60 foot) depth contour. First, qualitative reconnaissance surveys were conducted that covered the area off Wailea from the shoreline out to the limits of coral reef formation. Then, two quantitative transect sites were selected offshore of Wailea: Survey Site 1 was located downstream from the northern Honua'ula boundary between Polo and Palaua Beaches; Survey Site 2 was located between Ulua and Wailea Beaches. At each site, transect surveys were conducted, one in each of the dominant reef zones. Quantitative benthic surveys were then conducted by evaluating reef community composition in accordance with the Coral Reef Assessment and Monitoring Program protocols used by the Department of Land and Natural Resources (DLNR).

The main structural feature of the shoreline and nearshore areas downstream from Honua'ula are a series of crescent shaped white sand beaches separated by basaltic rocky headlands that extend up to several hundred meters offshore. Sand plains extend from the beach shorelines continuously to a depth of approximately 60 feet. The rocky headlands generally consist of extended fingers of exposed rock with sharply angled edges that form the shorelines of these features. Because of the vertical faces, there are essentially no well-defined intertidal platforms or extensive tide pools along the shoreline.

The seaward extensions of the rocky headlands that separate the beaches provide the major habitats for marine biota. The intertidal ranges of the submerged headlands are colonized by bands of the seaweeds *Anhfeltia concinna* and *Ulva fasciata*. Submerged portions of the rock surfaces are lined with various forms of encrusting red algae, and contain numerous urchins of the species *Echinometra matheai*, *Echinostrephus aciculatus*, and *Colobocentrotus atratus*, as well as numerous juvenile reef fish. As the headlands extend seaward, the top surfaces flatten out into dome-shaped fingers. At the seaward termini, the headlands grade into the sandy bottom, often with a distinct boundary between the rock-rubble platform and the sand bottom, generally at a depth of approximately 25-30 feet.

The coral reef communities that occur on the hard-bottom areas off the Wailea area consist of abundant and diverse assemblages of common Hawaiian marine life. The predominant taxon of macrobenthos (bottom-dwellers) throughout the reef zones are Scleractinian (reef-building) corals. Corals, primarily of the species *Pocillopora meandrina* (cauliflower coral) and *Porites lobata* (lobe coral) were by far the two most abundant forms. Other common corals observed were *Montipora capitata* (rice coral), *M. flabellata*

(blue rice coral), and *M. patula* (sandpaper rice coral), *Porites compressa* (finger coral) and *Pavona varians* (corrugated coral). Of note is that the richest communities in terms of both species number and bottom cover occur on the rocky outcrops that are elevated above the sand bottom. This is likely in response to lessened stress from abrasion from sand scour during periods when wave action is sufficient to re-suspend sand off the bottom.

At Site 1, the basaltic extension the rock headland was relatively narrow and steep-sided. Coral cover was greatest on the sloping sides of the rock finger, with total coral cover in the range of 50-75 percent of bottom cover. In addition to substantial coral cover, the top of the finger was also occupied by abundant slate-pencil sea urchins (*Heterocentrotus mammilatus*). Of particular note is that throughout the rocky finger reefs, there were no observations of any species of frondose macro-algae. This observation is of interest as extensive growth of several species of macro-algae in several shoreline areas of Maui have been the subject of considerable concern, particularly with respect to interactions between algal abundance and human activities.

At the seaward end of the rock-outcrop finger, coral abundance is reduced considerably, with the reef consisting primarily of a rock-rubble surface that ends at the juncture of the sand flats. While no macro-algae were observed in this zone, most of the rock/rubble bottom was covered with a thin veneer of micro-algal turf. Numerous boulders at the base of the finger outcrop were colonized by numerous small colonies of *Pocillopora meandrina* (cauliflower coral). This coral has been recognized as a "pioneering" species, in that it is often the first to colonize newly cleared substrata. In addition, it also has "determinate" growth, in that colonies grow to a certain size, or age, and then die. As a result, colonies of this species never reach a size larger than approximately one foot in diameter. Such a growth form does not occur for the other major genera found on Hawaiian reefs (*Porites*), which has an "indeterminate" growth form where colony life span is not limited by either size or age. The significance of the abundant small colonies of *Pocillopora meandrina* (cauliflower coral) at the deeper regions of Site 1 may be that it is an indication that a new year class is taking hold, or that re-colonization is beginning in an area where corals were removed by some factor. In either case, the occurrence of abundant recruiting colonies indicates that the present conditions are suitable for coral growth.

The physical structure of the reef at Site 2 is slightly different than at Site 1 in that the top of the outcrop is flatter and wider. Coral cover, consisting of the same common species as Site 1 (*Pocillopora meandrina* and *Porites lobata*), was somewhat greater on the flat reef of Site 2, with nearly complete coverage of the rocky substratum. As at Site 1, there were no observations of frondose macro-algae. The deeper seaward extension of the rocky headland at Site 2 was also different than at Site 1: while a relatively barren rock/rubble shelf occurred at the terminus of the reef at Site 1, corals, particularly mats of the branching finger coral *Porites compressa* (finger coral) extended to the sand floor at Site 2. Numerous large coral-covered boulders also extended onto the sand flats at the seaward end of the reef at Site 2.

Other than corals, the dominant group of macroinvertebrates inhabiting the reef surface off the survey sites are sea urchins. The most common urchins are the small species that bore into the rock surface (*Echinometra matheai*, *Echinostrephus aciculatus*) which occurred in all reef zones. The larger species, including the collector urchin *Tripneustes gratilla* and *Heterocentrotus mammillatus* were also abundant on the tops and sides of the rocky finger reefs. Sea cucumbers (Holothurians) or starfish (Asteroidea) were not commonly observed during the survey. No crown-of-thorns starfish (*Acanthaster planci*) were observed feeding on coral colonies, nor were there observations of recently bleached coral skeletons as a result of *Acanthaster* predation. The green conical-shaped sponge *Iotrocha protea* was observed on the sandy flats at the seaward ends of the reefs. The only commonly occurring mollusk was the oyster *Pinctata* spp.

While frondose benthic algae were conspicuously absent on the survey reefs, encrusting red calcareous algae (*Porolithon* spp., *Peysoneilia rubra*, *Hydrolithon* spp.) were abundant on rocky surfaces throughout the study area. These algae were abundant on bared limestone surfaces, and on the nonliving parts of coral colonies.

Reef fish community structure was largely determined by the topography and composition of reef structure. Fish were most abundant on the edges of the rocky outcrops and in areas of highest relief. Fish were abundant, but were small in size. Overall, fish community structure in the waters off Wailea is fairly typical of the assemblages found in undisturbed Hawaiian reef environments. The lack of abundance of food fish indicates that the area has been subjected to moderate amounts of fishing pressure.

POTENTIAL IMPACTS AND MITIGATION MEASURES

Marine Water Quality

The results of the nearshore water quality assessment (MRC 2010a) and further evaluation of the potential changes to groundwater composition (discussed in Section 3.5.1 above) indicate that there is little or no potential for alteration of the marine environment or negative impacts to marine waters due to Honua'ula. With potable water supplied by RO brackish well water and irrigation water supplied from brackish well water and R-1 recycled water, the nearshore water quality assessment concludes: "there will be no adverse affect to groundwater resources in areas in the vicinity of the project" (MRC 2010a). Regarding runoff, the assessment concludes that the detention basins will: 1) ensure that the peak rate of runoff leaving the Property will not increase over current conditions; and 2) capture floatables and suspended solids in the basins, thus reducing sediment loads discharging to the marine environment at the shoreline (MRC 2010a). Similarly, the assessment concludes that "there is little potential for any significant input of sediment to the marine environment resulting from [construction of] the proposed project" due to permit regulations and the predominant direction of wind (MRC 2010a). The assessment further concludes that: "the estimates of changes to groundwater and surface water would result in a decrease in nutrient and sediment loading to the ocean relative to the existing condition. With such a scenario, it is evident that there would be no expected

impacts to the nearshore marine ecosystem owing to development of Honua'ula" (MRC 2010a). The assessment states that: "All of these considerations indicate that the proposed Honua'ula project will not have any significant negative effect on water quality in the coastal ocean offshore of the property" (MRC 2010a).

In compliance with County of Maui Ordinance No. 3554 Condition 20:

- The Honua'ula nearshore water quality monitoring assessments conducted in 2005, 2006, 2008, ~~and~~ 2009, 2010, and 2011 provide pre-Honua'ula baseline data and an assessment of existing conditions of coastal water resources (groundwater and surface water) that receive surface or groundwater discharges from the hydrological unit where Honua'ula is located; Honua'ula nearshore water quality monitoring assessments will continue during construction and after Honua'ula is built;
- Current and future nearshore water quality monitoring assessments provide, and will provide, water quality data necessary to assess compliance with Section 11-54-06, HAR (Open Coastal Waters of the DOH Water Quality Standards);
- Current and future Honua'ula nearshore water quality monitoring assessments were done, and will continue to be done, in accordance with the current (and as may be amended) DOH methodology for Clean Water Act Section 305(b) water quality assessment, including the use of approved analytical methods and quality control/quality assurance measures; and
- After construction commences water quality data will be submitted annually to DOH for use in future Hawaii Water Quality Monitoring and Assessment Reports prepared under Clean Water Act Sections 303(d) and 305(b) (i.e., Integrated Reports).

In further compliance with County of Maui Ordinance No. 3554 Condition 20, it is noted that the 2006 Integrated Report (DOH 2008) lists two areas of nearshore receiving waters downstream from Honua'ula as "impaired," meaning State ocean water quality standards for specific criteria were not attained based on data collected in 2006 or before. The Clean Water Act requires that TMDLs be established for specific criteria that do not meet the standards; however, DOH, the State agency responsible for developing TMDLs, has not developed any TMDL criteria for any marine areas off the coast of Maui (DOH 2010). Honua'ula is not yet built, and thus is not currently contributing to any downstream water quality impacts. Comparison of data from the 2006 Integrated Report and the current Honua'ula nearshore water quality monitoring study (~~MRC 2010a~~ 2011) shows that water quality results can vary over time. At the time the Draft EIS was prepared (March 2010) DOH anticipates anticipated publishing an update of the 2006 Integrated Report in 2010 however, as of May 2012 an updated report was not published., and, in In light of the recent test results from the Honua'ula study, it is possible that ~~the 2010~~ a future update will find a lesser degree of impairment than the 2006 Integrated Report. If the State's Integrated Report lists the receiving waters downstream from Honua'ula as "impaired" after construction of Honua'ula commences, and if by that time, DOH has developed TMDL criteria for receiving waters downstream from Honua'ula, then the Honua'ula nearshore water quality monitoring program will be amended to evaluate land-based

pollutants, including: 1) monitoring of surface water and groundwater quality for the pollutants identified as the source of impairment; and 2) providing estimates of total mass discharge of those pollutants on a daily and annual basis from all sources, including infiltration, injection, and runoff. The results of the land-based pollution water quality monitoring and loading estimates will be submitted to DOH Environmental Planning Office, TMDL Program.

In preparing the nearshore water quality monitoring assessment (which provides pre-construction baseline data) Honua'ula Partners, LLC is in compliance with County of Maui Ordinance No. 3554 Condition 18a, which requires compliance with Condition 1 of DOH's "12 Conditions," relating to establishing baseline groundwater/vadose zone (see Section 3.5.1 (Groundwater)) and nearshore water quality data and reporting findings to DOH.

Marine Environment

Results of the ~~preliminary~~ assessment of the marine community structure of the nearshore waters downstream from Honua'ula (MRC 2010b) do not reveal any substantial effects to marine community structure from human activities along the shoreline (with the possible exception of overfishing). Aggregations of nuisance algae do not occur in the area.

The creation of Honua'ula will not involve alteration of the shoreline or offshore environments, as Honua'ula is separated from the shoreline by the existing Wailea Resort. The marine community structure assessment report (MRC 2010b) concludes: 1) potential changes to water chemistry as a result of the alteration of groundwater flow and composition (see Section 3.5.1 (Groundwater)) will not change the existing character of the marine environment to an extent that will alter biotic community structure; 2) Honua'ula does not appear to present the potential for alteration of the offshore environment; and 3) none of the activities necessary for the creation of Honua'ula has the potential to induce large changes in physico-chemical properties that could affect biotic community structure.

In compliance with County of Maui Ordinance No. 3554 Condition 20:

- In addition to water quality monitoring, baseline ecological monitoring (i.e. marine community structure assessment) has been conducted in accordance with the Coral Reef Assessment and Monitoring Program protocols used by DLNR; and
- Marine community structure assessment surveys (i.e. ecological monitoring) will be done annually and the annual results will be reported to the Aquatic Resources Division, DLNR.

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, *'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~~ 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,~~ 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 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.

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 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, *'āwikipiki* (*Canavalia pubescens*), is considered to be a candidate endangered species by USFWS. Five *'āwikipiki* 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 'āwīkīwī 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 'āwīkīwī 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 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, 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 'āwikiwiki 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 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 'Āhihi-Kīna'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:

- 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



LEGEND

Native Plant Preservation Area	
	Approximate Acreage
Native Plant Preservation Area (Easement)	+/-40ac.
Native Plant Conservation Areas	
Ungraded Areas	+/-8ac.
Natural Gulches	+/-28ac.
Total :	+/-76ac.

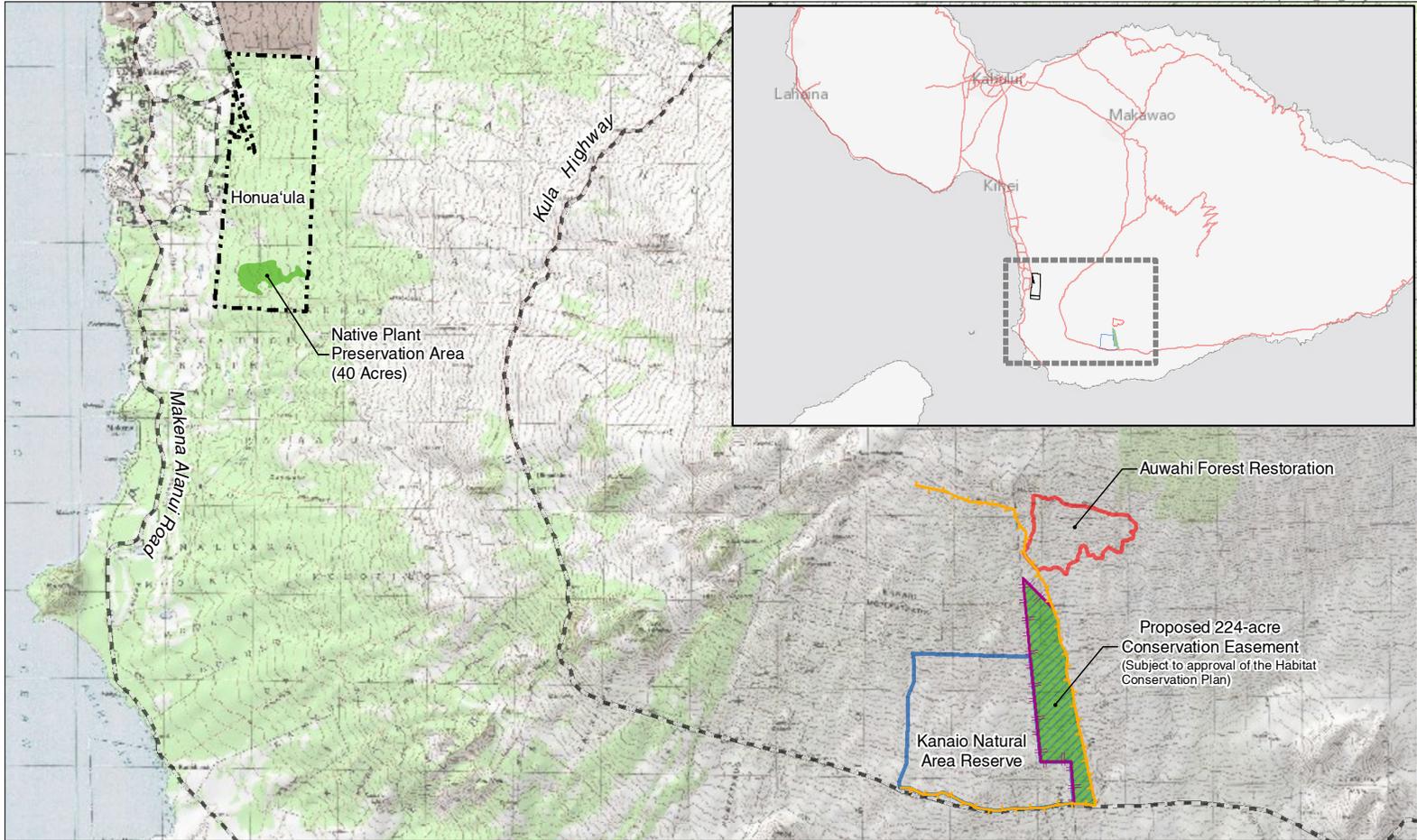
Open Space	
	Approximate Acreage
Golf Fairways	+/-110ac.
Parks	+/-6ac.
Landscape Buffers	+/-24ac.
Naturalized Landscape (Existing and/or Enhanced)	+/-53ac.
Outplanting Areas for Native Plants	+/-17ac.
Total :	+/-210ac.

Miscellaneous	
	Approximate Acreage
Lakes	+/-110ac.
Drainage/ Detention Basin	+/-6ac.

Preserved Archaeology	
	Approximate Acreage
Historic Wall	+/-24ac.
Archaeological Sites	+/-53ac.

Figure 12
Native Plant Plan
Honua'ula
 Honua'ula Partners, LLC
 ISLAND OF MAUI
 NORTH LINEAR SCALE (FEET)
 0 300 600 1,200
 PLAN BY: **VITA**
 PLANNING & LANDSCAPE ARCHITECTURE
 PBR HAWAII & ASSOCIATES, INC.

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



LEGEND

- Honua'ula
- Native Plant Preservation Area (40 Acres)
- Major Roads
- Kanaio Natural Area Reserve
- Auwahi Forest Restoration
- Proposed 224-acre Conservation Easement (Subject to approval of the Habitat Conservation Plan)
- Existing Fence
- Proposed Fence

Figure 12a
 On- and Off-Site Mitigation Areas
 Honua'ula

Honua'ula Partners, LLC
 North

Island of Maui

LINEAR SCALE (FEET)
 0 2,500 5,000 10,000

Source: SWCA
 Disclaimer: This Graphic has been prepared for general planning purposes only and should not be used for boundary interpretations or other spatial analysis.

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,~~ in accordance with the Conservation/Preservation Plans (Condition 27c). 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.~~

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 <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:

- 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 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.

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
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 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;

- **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 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 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 Principals**
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 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:

- **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.

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), 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. 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.

SWCA also completed wildlife surveys for 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 (Appendix H); 2) the off-site wells, waterline, and storage tank (Appendix E); 3) the widening of Pi'ilani Highway (Appendix

D of the Pi'ilani Highway Widening Project Final EA contained in Appendix R of this EIS); and 4) the Wailea Ike Drive and Wailea Alanui Drive intersection improvements (Appendix B of the Wailea Ike Drive and Wailea Alanui Drive Intersection Improvements Final EA contained in Appendix S of this EIS).

Since the wildlife survey of the areas of the wastewater transmission line alignments was conducted, a decision has been made regarding which preferred alignment to use. 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 H contains the complete wildlife survey of the alternative wastewater transmission line alignments.

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. Similarly, tree tobacco (*Nicotiana glauca*) plants were found along the Pi'ilani Highway widening corridor and the selected wastewater transmission line alignment for possible connection to the Mākena Resort WWRF. However, only tree tobacco (*Nicotiana glauca*) plants at one point along the selected alignment showed substantial leaf damage that could be possibly attributed to the Blackburn's sphinx moth caterpillar.

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.

No Federal or State of Hawai'i listed threatened, endangered, or candidate species were observed in the areas of: 1) the off-site wells, waterline, and storage tank; 2) the widening of Pi'ilani Highway; and 3) the Wailea Ike Drive and Wailea Alanui Drive intersection improvements.

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~~ Indigenous 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~~ Endemic seabirds that may fly over the site at night include the endangered Hawaiian petrel (*Pterodroma sandwichensis*) and the threatened Newell's shearwater (*Puffinus auricularis newelli*). While seabirds may traverse the area at night during the breeding season (February 1 through December 15), ~~they do not~~ none are known to nest nest on within the Property.

A single pueo (*Asio flammeus sandwichensis*) and a single 'iwa bird (*Fregata minor*) was observed during the survey of the alternative wastewater transmission line alignments. The pueo sighting did not occur on the selected wastewater alignment but in the vicinity. 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.

No native birds were observed in the areas of: 1) the off-site wells, waterline, and storage tank; 2) the widening of Pi'ilani Highway; and 3) the Wailea Ike Drive and Wailea Alanui Drive intersection improvements.

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.

No migratory birds were observed in the areas of the alternative wastewater transmission line alignments.

The Pacific Golden-Plover was observed in the areas of: 1) the off-site wells, waterline, and storage tank; and 2) the Wailea Ike Drive and Wailea Alanui Drive intersection improvements. While not observed during the survey of the alternative wastewater line alignments, the Pacific Golden Plover is expected to occur in these areas during the migratory season.

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*).

A few cattle egrets (*Bulbulcus ibis*) were observed in the areas of: 1) the widening of Pi'ilani Highway; and 2) the Wailea Ike Drive and Wailea Alanui Drive intersection improvements.

Various other introduced bird species were observed in the areas of: 1) the alternative wastewater transmission line alignments; 2) the off-site wells, waterline, and storage tank; 3) the widening of Pi'ilani Highway; and 4) the Wailea Ike Drive and Wailea Alanui Drive intersection improvements. The most abundant species common to all areas were the zebra dove (*Geopelia striata*) and common myna (*Acridotheres tristis*).

Mammals

The endangered Hawaiian Hoary Bat was the only native mammal observed during the SWCA (2010c) survey of the Property. 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.

No Federal or State of Hawai'i listed threatened, endangered, or candidate mammal species were observed in the areas of: 1) the alternative wastewater transmission line alignments; 2) the off-site wells, waterline, and storage tank; 3) the widening of Pi'ilani Highway; and 4) the Wailea Ike Drive and Wailea Alanui Drive intersection improvements.

POTENTIAL IMPACTS AND MITIGATION MEASURES

~~Honua'ula is not expected to significantly impact effect any listed or candidate endangered or threatened species insofar as extensive mitigation measures will be implemented to offset, avoid, and minimize impacts, leading to a net benefit as defined in Chapter 195D, HRS. 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

Blackburn's Sphinx Moth – While evidence of the live caterpillars and other sign of Blackburn's sphinx moths (*Manduca blackburni*) was have been found within the

Honua'ula property (~~frass, cut stems and leaves, and live caterpillars~~), ~~no adult Blackburn's sphinx moths were observed.~~

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 has expressed concern that "habitat loss within the project site could adversely impact Blackburn's sphinx moth populations within this region of Maui."

A discussed above in Section 3.6 (Botanical Resources) and below in the following sections, 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.

To protect Blackburn's sphinx moths on-site, Honua'ula Partners, LLC will:

- ~~Provide~~ Protect habitat for Blackburn's sphinx moths within the 40-acre 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~~ 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;
- 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~~ selected wastewater 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, caterpillars, 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.

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.

The proposed approximately 224-acre perpetual conservation easement adjacent to the eastern boundary of the Kanaio Natural Area Reserve contains native dry land habitat and 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.

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.

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.

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
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. The on- and off-site mitigation areas are subject to the approval of the Habitat Conservation Plan by USFWS and DLNR. The purpose of the Habitat Conservation Plan is to:

1. Offset the potential impact of Honua'ula on two Covered Species (Blackburn's sphinx moth and nēnē) with measures to protect and provide a net benefit to these species; and
2. Provide avoidance and minimization measures expected to avoid any negative impacts on five additional endangered species (the Hawaiian duck, Hawaiian silt, Hawaiian coot, Hawaiian petrel, and Hawaiian Hoary bat), one threatened species (Newell's shearwater), one candidate endangered species ('āwikiwiki), and the Hawaiian short-eared owl (pueo).

The Habitat Conservation Plan will be in support of an Incidental Take Permit (ITP) in accordance with Section 10(a)(1)(B) of the federal Endangered Species Act (ESA) of 1973, as amended, and an Incidental Take License (ITL) in accordance with Chapter 195D, HRS. The Habitat Conservation Plan will include: specific avoidance, minimization, and mitigation measures; measures of success, and implementation specifics, including details on administration, monitoring and reporting, and funding.

Honua'ula Partners, LLC will fund the initial 15-year period covered by the Habitat Conservation Plan and the ITP/ITL. To secure funding in perpetuity for the maintenance of the on- and off-site mitigation areas after the initial 15-year period, Honua'ula Partners, LLC will establish an endowment, which will be overseen by the Honua'ula Master Home Owners' Association with financial management provided by a licensed real property management company.

Hawaiian Hoary Bat – 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 by bats cannot be made based on existing evidence.

Hawaiian hoary bats are known to roost in native and non-native trees greater than 15 feet tall. During the peak pup rearing season between June 1 and September 15 young Hawaiian hoary bat pups may be incapable of flight and harmed or killed if their roost site is disturbed. 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 minimize the potential for harm to juveniles, removal and trimming of trees greater than 15 feet tall will be avoided during the peak pup rearing season between June 1 and September 15. 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~~ trees 15 feet in height and taller during construction to reduce the potential take of nonvolent 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~~ avoidance and ~~mitigation~~ minimization measures, a ~~multi-species~~ the draft Habitat Conservation Plan (to include the candidate endangered ~~‘āwikiwiki’)~~ will be ~~prepared under~~ finalized 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.~~ The final Habitat Conservation Plan will provide: 1) measures to offset the potential impact of Honua'ula on two Covered Species; and 2) avoidance and minimization measures expected to avoid any negative impacts on five additional endangered species (including the Hawaiian hoary bat), one threatened species, one candidate endangered species, and the Hawaiian short-eared owl (pueo). Because avoidance and minimization measures are expected to avoid any impacts to the Hawaiian hoary bat, an ITP/ITL will not be requested for the Hawaiian hoary bat.

Nēnē – Nēnē are currently not found at or near the Property (SWCA 2010c); however creation of golf greens and lawns may conceivably attract nēnē. As dicussed below, avoidance and minimization measures will be implemented in regard to native birds; however SWCA estimates that there may be direct or indirect take of nēnē as a result of golf course operations. The final Habitat Conservation Plan will include measures to offset the potential impact of Honua'ula on nēnē and provide a net benefit. In addition the HCP will be in support of an ITP/ITL for Blackburn's sphinx moth and nēnē in accordance with Section 10(a)(1)(B) of the federal Endangered Species Act (ESA) of 1973, as amended, and Chapter 195D, HRS.

Other Endangered Species – Avoidance and minimization measures expected to avoid any negative impacts on additional endangered species (the Hawaiian duck, Hawaiian silt, Hawaiian coot, and Hawaiian petrel) are discussed below. Similar to the nēnē these species are not currently found at the Property, but may be attracted to the Property after construction of the golf course. The final Habitat Conservation Plan will include avoidance and minimization measures to avoid any impacts to the Hawaiian duck, Hawaiian silt, Hawaiian coot, and Hawaiian petrel. Because these measures are expected to avoid any impacts to these species, an ITP/ITL for these species will not be requested.

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
- Conduct nest searches when necessary ahead of construction activities, and ~~Delay~~ delay construction around any areas found to contain *pueo* nests until chicks have fledged.

Several species of ~~native~~ endemic seabirds (including the endangered Hawaiian petrel (*Pterodroma sandwichensis*) and the threatened Newell's shearwater (*Puffinus auricularis newelli*)) may traverse ~~the area but they do not nest on~~ the Property at night during the breeding season (February 1 through December 15) however, none are known to nest within the Property. Any outdoor lighting could result in seabird disorientation, fallout, injury, and mortality. Young birds (fledglings) traversing the Property between September 15 and December 15, in their first flights from mountain nests to the sea, are particularly vulnerable. Seabirds are attracted to lights and after circling the lights they may collide with nearby wires, buildings, or other structures or they may land on the ground due to exhaustion. Downed seabirds are subject to high mortality caused by collision with automobiles, predation by dogs, cats, and wild animals, and starvation. To minimize potential impacts to native seabirds Honua'ula Partners, LLC will:

- Shield outdoor lights in compliance with Chapter 20.35 (Outdoor Lighting), MCC₇, ~~avoid~~ and the Seabird Friendly Lighting Solution guide provided by USFWS;
- Avoid night-time construction, and provide; 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* (Hawaiian duck) (*Anas wyvilliana*), *ae'o* (Hawaiian silt) (*Himantopus mexicanus knudseni*), *'alae ke'oke'o* (Hawaiian coot) (*Fulica alai*), ~~*'alae 'ula* (*Gallinula chloropus sandvicensis*)~~, and *nēnē* (*Branta sandvicensis*). In addition, there is the potential for lighting to attract threatened *'a'o* (Newell's shearwater) (*Puffinus auricularis newelli*) and endangered *'ua'u* (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), MCC₇, ~~and avoid~~ and the Seabird Friendly Lighting Solution guide provided by USFWS;
- Avoid night-time construction;
- Implement measures prohibiting the free movement of pets, discouraging the feeding of feral animals, and preventing increases in the populations of house mice, rats, mongoose, and feral cats by:

- Incorporating these measures into community rules and regulations, such as covenants, conditions, and restrictions; and
- Developing a public education program to ensure effectiveness; 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 Plant Conservation Areas throughout the Property.

In addition to the above avoidance and minimization measures, the draft Habitat Conservation Plan will be finalized in collaboration with USFWS and DLNR in accordance with Section 10(a)(1)(B) of the Endangered Species Act and Chapter 195D, HRS. The final Habitat Conservation Plan will provide: 1) measures to offset the potential impact of Honua'ula on two Covered Species (including nēnē); and 2) avoidance and minimization measures expected to avoid any negative impacts on five additional endangered species (including the Hawaiian duck, Hawaiian silt, Hawaiian coot, and Hawaiian petrel), one threatened species (Newell's shearwater), one candidate endangered species, and the Hawaiian short-eared owl (pueo).

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 Conservation Areas throughout the Property.