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DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

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September 24, 2008

Ms. Kathrine Puana Kealoha, Esq.
Director
Office of Environmental Quality Control
235 South Beretania Street, Suite 702
Honolulu, Hawaii 96813

Subject: Lanai Wind Farm Project Lanai, Hawaii Environmental Assessment / Environmental Impact Statement Preparation Notice

Dear Ms. Kealoha,

As the accepting authority for the subject project pursuant to Act 207, Session Laws of Hawaii 2008, the State Department of Business, Economic Development and Tourism has reviewed the subject environmental assessment and determined that the proposed action requires the preparation of an Environmental Impact Statement based on the significance criteria set forth in Section 11-200-12 of Title 11, Chapter 200, Administrative Rules, State of Hawaii Department of Health. Please publish notice of availability for this project in the October 8, 2008 OEQC Environmental Notice.

We have enclosed a completed OEQC Publication Form, one copy of the document in pdf format, two copies of the environmental assessment / environmental impact statement preparation notice and the project summary on disk. Please call Mr. Joshua Strickler at 587-3837 if you have any questions.

Sincerely,

Theodore E. Liu

Enclosure: Lanai Wind Farm EA/EISPN

c: Mr. Joshua Strickler

Environmental Assessment/Environmental Impact Statement Preparation Notice
Lanai Wind Farm Project
Lanai, Hawaii

Accepting Authority:

State of Hawaii

Department of Business, Economic Development & Tourism

Prepared for:

Castle & Cooke Resorts, LLC

Prepared by:

Tetra Tech EC, Inc.

And

R. M. Towill Corporation

September 19, 2008

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ACRONYMS

BLNR	Board of Land and Natural Resources
BMP	Best Management Practices
CDUA	Conservation District Use Application
CDUP	Conservation District Use Permit
CFR	Code of Federal Regulations
CWA	Clean Water Act
CZM	Coastal Zone Management
dBA	decibels/sound pressure level
DBED&T	Department of Business, Economic Development and Tourism
DEIS	Draft Environmental Impact Statement
DLNR	Department of Land and Natural Resources
DOFAW	Division of Forestry and Wildlife
DOH	Department of Health
EA	Environmental Assessment
EIS	Environmental Impact Statement
EISPN	Environmental Impact Statement Preparation Notice
EFH	essential fish habitat
EO	Executive Order
ESA	Endangered Species Act
HAR	Hawaii Administrative Rules
HCEI	Hawaii Clean Energy Initiative
HCP	Habitat Conservation Plan
HDD	horizontal directional drilling
HECO	Hawaiian Electric Company
HRS	Hawaii Revised Statutes
HIHWNMS	Hawaiian Islands Humpback Whale National Marine Sanctuary
ITL	Incidental Take License
ITP	Incidental Take Permit
kHz	kilohertz
MBTA	Migratory Bird Treaty Act
MLLW	Mean lower low water
NEPA	National Environmental Protection Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOAA Fisheries	National Oceanic and Atmospheric Administration, National Marine Fisheries Service
NOI	Notice of Intent
NCSS	National Cooperative Soil Survey
NRCS	Natural Resource Conservation Service

PL	public law
ROI	Region of Influence
RPS	renewal portfolio standard
SMA	Special Management Area
SPCC	Spill Prevention, Control, and Countermeasure
USACE	U.S. Army Corp of Engineers
USDOE	U.S. Department of Energy
USFWS	U.S. Fish and Wildlife Service
WRA	Wind Resource Area

1. INTRODUCTION

CHAPTER 1
INTRODUCTION

This Environmental Assessment/Environmental Impact Statement Preparation Notice (EA/EISPN) is prepared pursuant to the State of Hawaii Environmental Impact Statement Law, Chapter 343, Hawaii Revised Statutes (HRS), and Title 11, Chapter 200 Hawaii Administrative Rules (HAR) (Environmental Impact Statement [EIS] Rules). The proposed project, by Castle & Cooke Resorts, LLC (Castle & Cooke), is for the development of a wind farm on Lanai, County of Maui, Hawaii. Figure 1 shows the general location of the proposed project in relation to the adjacent Hawaiian Islands. Figure 2 illustrates the proposed project site and adjacent properties. Figure 3 is a key or land use map, which shows the project area relative to surrounding geographical features.

This EA/EISPN is being prepared to address requirements under Title 11, Chapter 200 HRS, in that the Lanai Wind Farm Project proposes a use within the State Conservation District administered by the Hawaii Department of Land and Natural Resources (DLNR). The proposed project has been determined to have potentially significant environmental impacts warranting the preparation of an Environmental Impact Statement (EIS). The State of Hawaii Department of Business, Economic Development, & Tourism (DBED&T) will be the accepting authority for the EIS pursuant to Act 207 SLH 2008 which establishes a renewable energy facility siting process and designates DBED&T as the accepting authority for any final EIS prepared under this Act.

1.1 BACKGROUND

1.1.1 Current Energy Status in Hawaii

Total energy consumption in the State of Hawaii averaged 300 trillion btu from 1990-2005 reaching a high of 333 trillion btu in 2005. This energy use is in stark contrast to the average of 193 billion btu between 1960 and 1985. From 1990 to 2005, on average, fossil fuels provided approximately 93 percent of the energy consumed to meet Hawaii's steadily increasing demand. During that same time period the percentage of energy derived from renewable resources averaged 7 percent. The percentage of energy supplied by renewable resources declined from an average of 8.4 percent between 1990 and 1995 to an average of 6 percent between 1996 and 2005 (DBED&T 2008).

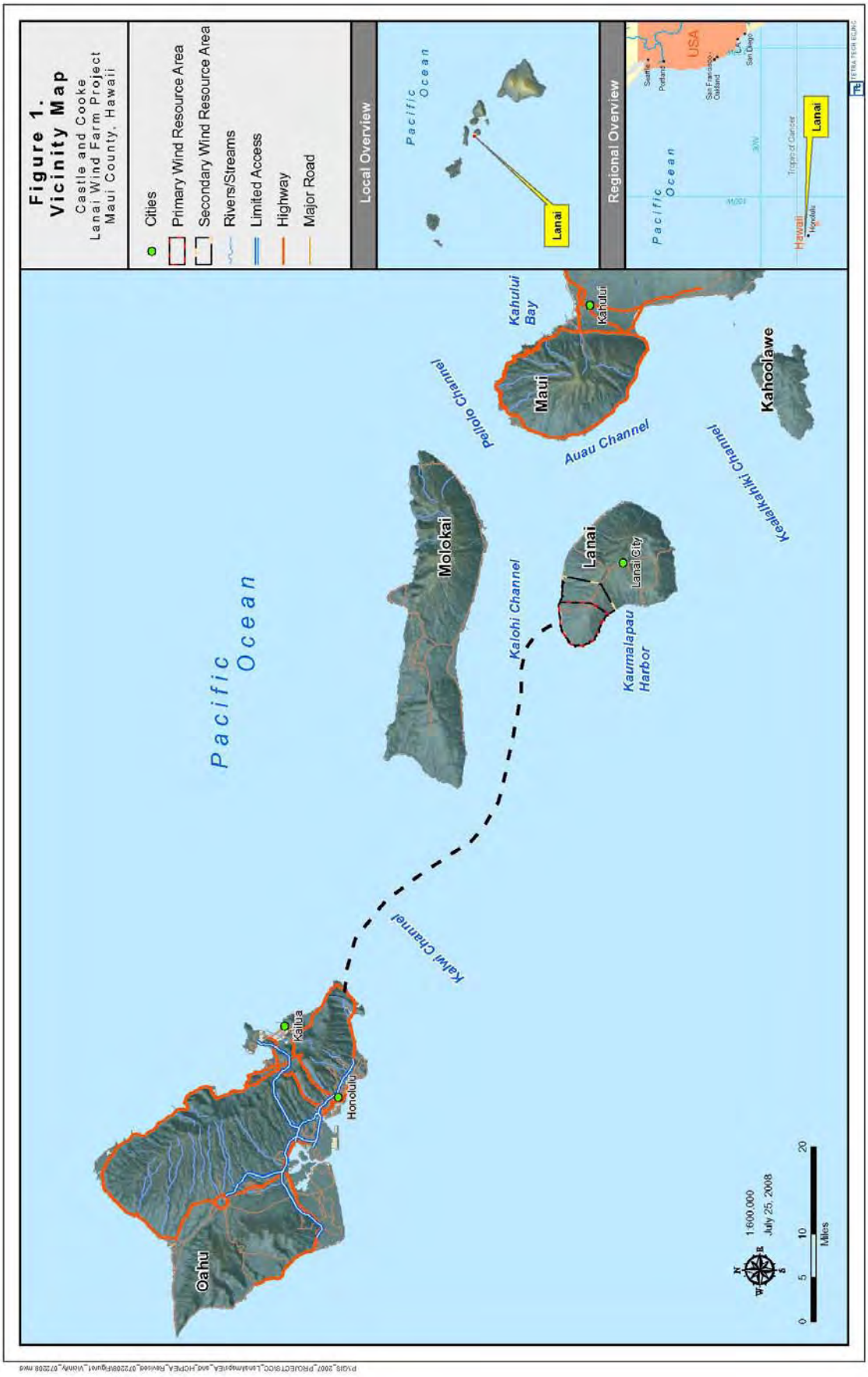
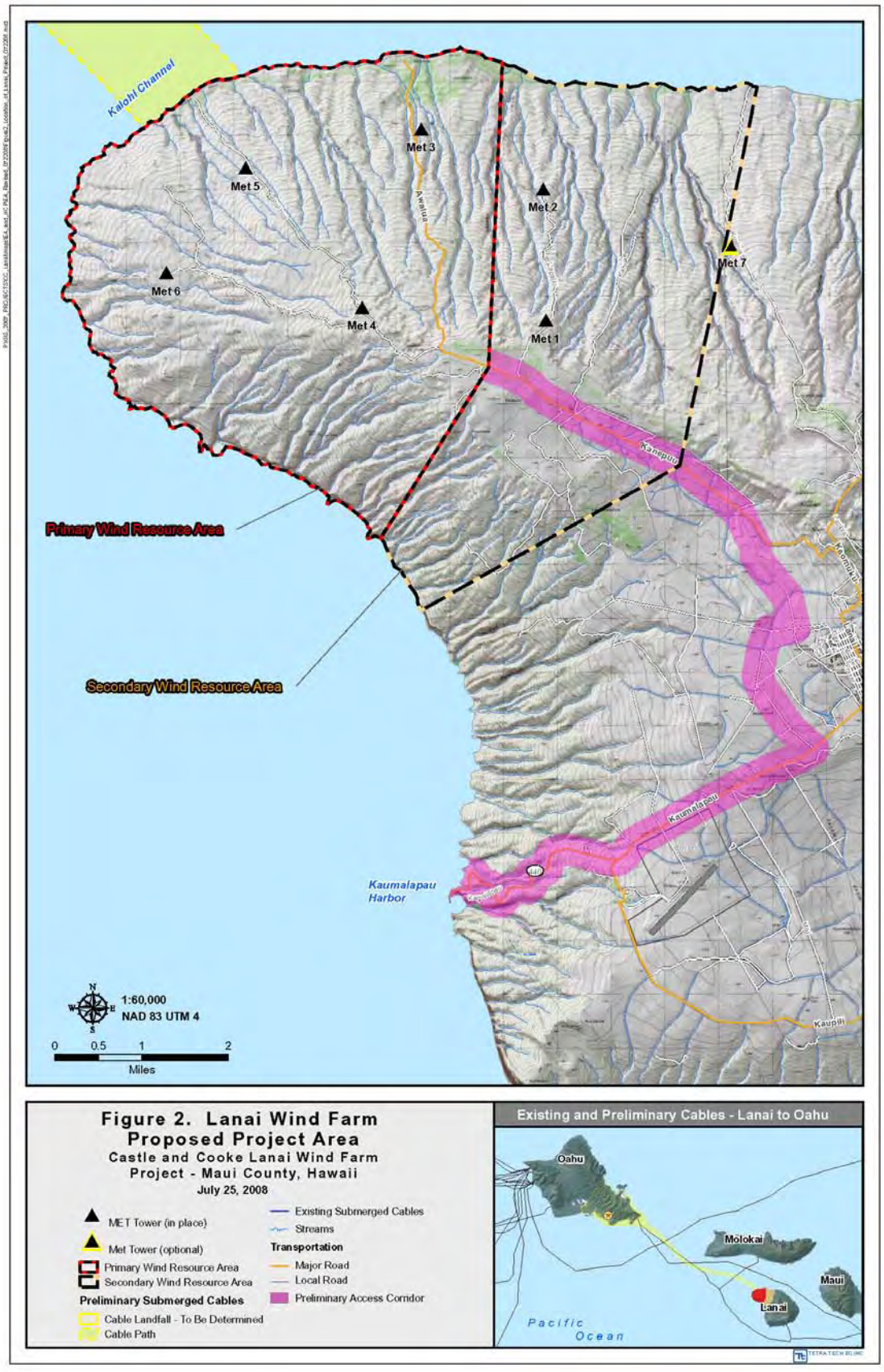
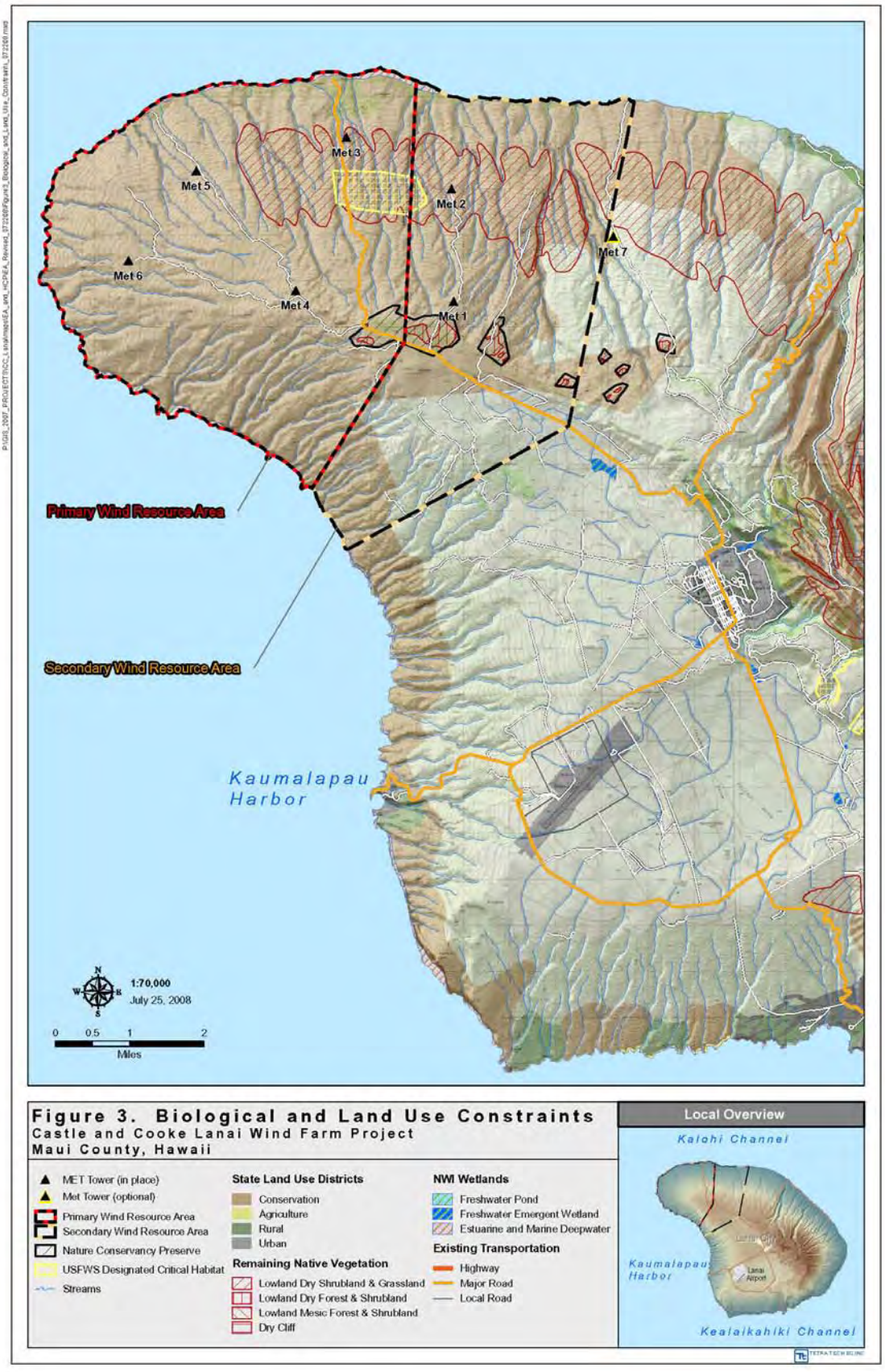


Figure 1.
Vicinity Map
Castle and Cooke
Lanai Wind Farm Project
Maui County, Hawaii
Cities
Primary Wind Resource Area
Secondary Wind Resource Area
Rivers/Streams
Limited Access
Highway
Major Road
Local Overview
Regional Overview
Pacific Ocean
Lanai
USA
Hawaii
Honolulu
Kaiwi Channel
Kalohi Channel
Pailolo Channel
Auau Channel
Keahakahiki Channel
Kahului Bay
Kaumalapau Harbor
Oahu
Kailua
Molokai
Maui
Kahului
Lanai
Lanai City
Kahoolawe
1:600,000
July 25, 2008
Miles
0
5
10
20


Kaiohi Channel
Met 3
Met 5
Met 2
Met 7
Met 6
Met 4
Met 1
Awalua
Kanepuu
Primary Wind Resource Area
Secondary Wind Resource Area
Kaumalapau
Kaumalapau Harbor
Kaupili
1:60,000
NAD 83 UTM 4
0 0.5 1 2
Miles
Figure 2. Lanai Wind Farm
Proposed Project Area
Castle and Cooke Lanai Wind Farm
Project - Maui County, Hawaii
July 25, 2008
MET Tower (in place)
Met Tower (optional)
Primary Wind Resource Area
Secondary Wind Resource Area
Preliminary Submerged Cables
Cable Landfall - To Be Determined
Cable Path
Existing Submerged Cables
Streams
Transportation
Major Road
Local Road
Preliminary Access Corridor
Existing and Preliminary Cables - Lanai to Oahu
Oahu
Molokai
Maui
Lanai
Pacific
Ocean


Met 3
Met 5
Met 2
Met 7
Met 6
Met 4
Met 1
Primary Wind Resource Area
Secondary Wind Resource Area
Kaumalapau Harbor
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E
S
1:70,000
July 25, 2008
0 0.5 1 2
Miles
Figure 3. Biological and Land Use Constraints
Castle and Cooke Lanai Wind Farm Project
Maui County, Hawaii
MET Tower (in place)
Met Tower (optional)
Primary Wind Resource Area
Secondary Wind Resource Area
Nature Conservancy Preserve
USFWS Designated Critical Habitat
Streams
State Land Use Districts
Conservation
Agriculture
Rural
Urban
Remaining Native Vegetation
Lowland Dry Shrubland & Grassland
Lowland Dry Forest & Shrubland
Lowland Mesic Forest & Shrubland
Dry Cliff
NWI Wetlands
Freshwater Pond
Freshwater Emergent Wetland
Estuarine and Marine Deepwater
Existing Transportation
Highway
Major Road
Local Road
Local Overview
Kalohi Channel
Kaumalapau Harbor
Lanai Airport
Kealaikahiki Channel

In February 2008, the average retail price of electricity in the United States for all sectors was 8.96 cents per kilowatt-hour. During that same time period Hawaii led the way with the most expensive retail price at 26.79 cents per kilowatt-hour (EIA 2008). Wind energy is among the most cost-competitive renewable resources. Today, the development of wind energy is economically competitive at costs per kilowatt-hour that rival those of a gas-fired power plant (Tisch 2008). When considering these costs in addition to the consequences of continuing to release CO_2 and other greenhouse gases into the atmosphere from burning fossil fuels, increasing the use of wind energy provides Hawaii both financial and environmental benefits.

In 2006, two wind farms came on line, providing additional renewable energy sources for Hawaii. On the island of Hawaii, Hawi Renewable Development completed a 10.56- MW wind farm. On Maui, Kaheawa Wind Power built a 30-MW wind farm which consists of 20 wind turbines. Apollo Energy Corporation's Pakini Nui 20.5 MW wind farm is now operating at South Point on the Big Island. These are a few of the renewable energy projects that just begin to help meet Hawaii's future energy needs (HECO 2008). Continued development of wind energy in Hawaii is limited by land availability in regions where commercially viable winds are available. Although commercially viable winds may be located offshore, nearshore waters, outside marine sanctuaries, are too deep for current offshore wind technology. Therefore, additional wind energy facilities may be considered in other locations of Hawaii so that the state can move toward being energy self-sufficient.

1.1.2 Hawaii's Policies for Renewable Energy

Hawaii established a renewable portfolio standard (Chapters 269-91 to 95, HRS) in which the electric utilities are to increase the percentage of electricity generated using renewable resources. Hawaii replaced its renewable portfolio standard (RPS) with higher, enforceable standards in 2004 and again in 2006 requiring utilities to provide 10 percent of their electricity from renewable sources by the year 2010, 15 percent by 2015, and 20 percent by 2020. On January 28, 2008, the state of Hawaii signed a memorandum of understanding with the U.S. Department of Energy (DOE) to develop a plan to have 70 percent of the state's electricity to be provided from renewable sources by the year 2030.

Hawaii defines renewable energy as electricity produced by wind, solar energy, hydropower, landfill gas, biomass (including municipal solid waste), geothermal resources, ocean thermal energy conversion, wave energy, biofuels, hydrogen fuels derived from renewable energy, and fuel cells (if the fuel is derived from renewable sources). If biofuels, hydrogen, or fuel cell fuels are produced by a combination of renewable and nonrenewable means, or if fossil and renewable fuels are cofired in the same generating unit, the project receives credit in proportion to the percentage of electricity derived from renewable energy (USDOE 2004). Hawaii also defines renewable energy as electrical energy savings brought about by the use of solar and heat pump water heating, seawater air conditioning, district cooling systems, solar air conditioning and ice storage, quantifiable energy conservation measures, use of rejected heat from small-scale cogeneration, and customer-sited combined heat and power systems (USDOE 2004).

Since the establishment of the RPS, Hawaii has continued to pass legislation intended to enhance the state's energy self-sufficiency and reduce greenhouse gas emissions. House bills passed in 2006 and 2007 provided Hawaii with a framework to move toward energy self-sufficiency by focusing on energy efficiency and promoting renewable energy sources. These included HB2848 CD1, HB 2175 CD1, and SB 988 CD1.

Most recently in 2008, HB 2505 CD1 established a full-time, temporary renewable energy facilitator position within the Department of Business, Economic Development, and Tourism and provided funding for designated energy program personnel and activities. HB 2863 CD1 (now Act 207 SLH 2008) established a renewable energy facility siting process to expedite the review and action upon state and county permits necessary for the siting, development, construction, and operation of a renewable energy facility of at least 200 megawatts of electricity and established a renewable energy facility siting special fund.

These and other legislative actions aimed at molding an energy self-sufficient Hawaii were accompanied by a Memorandum of Understanding between the US Department of Energy (USDOE) and the State of Hawaii establishing the Hawaii Clean Energy Initiative (HCEI), a long-term partnership designed to transform Hawaii's energy system to one that utilizes renewable energy and energy efficient technologies for a significant portion of its energy needs. The partnership aims to position Hawaii to be able to supply 70 percent of its energy needs using clean energy by 2030. This increase in renewable energy could reduce Hawaii's current crude oil consumption by 72 percent (State of Hawaii and USDOE 2008).

1.2 PURPOSE AND OBJECTIVES

The objective of the Lanai Wind Farm project is to respond to the State's legislative mandates to transform Hawaii's energy system to one that utilizes renewable energy and energy efficient technologies for a significant portion of its energy needs. The proposed 300-400 MW Lanai wind energy facility would benefit the State of Hawaii and Hawaii's citizens by reducing Hawaii's dependency on fossil fuels and providing clean, dependable, and renewable electricity while reducing greenhouse gas emissions and meeting established environmental rules and regulations.

1.3 STUDIES AND ASSESSMENTS THAT MAY BE CONDUCTED FOR THE PROPOSED PROJECT

A preliminary description of the environment and preliminary proposed impacts has been provided in this EA/EISPN. The information contained in this document has been developed from site visits, technical consultant reports, public agency input, and generally available information regarding the characteristics of the proposed site and surrounding areas. The consultants reports that are referenced in this document may be appended to the Draft Environmental Impact Statement (DEIS).

Technical surveys and studies associated with the environmental elements cited in Table 1 may be conducted if necessary to assess the current natural conditions and physical environment and determine potential effects of the proposed Lanai Wind Farm Project on sensitive resources. Assessments of available information and/or environmental studies currently being or to be conducted may be appended to the DEIS.

Table 1.
Studies and Assessments That May Be Conducted for the Proposed Lanai Wind Farm Project

1	Air and Climate
2	Archaeological Inventory Survey
3	Avian Surveys
4	Botanical Surveys
5	Biological Resources
6	Cumulative Impacts
7	Cultural Impact Assessment
8	Geological Survey
9	Hazardous Waste
10	Hydrology, Water Resources
11	Land Use
12	Marine Biology
13	Noise
14	Recreation
15	Socioeconomic
16	Utilities and Public Services
17	Visual and Aesthetics

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2. PROJECT DESCRIPTION

CHAPTER 2
PROJECT DESCRIPTION

Castle & Cooke is proposing to install a 300 to 400 MW wind generation facility consisting of approximately 100 to 200 wind turbines on the island of Lanai in Maui County, Hawaii. The wind turbines would be separated by approximately 1,300 feet. The final wind turbine locations would be determined based upon site-specific wind measurements (currently being collected), topographical features in the project area, location of sensitive biological and cultural resources, and the type of wind turbine selected (e.g., size). Electricity produced from the wind farm may be used on Lanai and transported via a submarine cable to the island of Oahu. Figure 4 illustrates existing cables that occur between some of the main Hawaiian Islands and a preliminary route for the proposed cables between Lanai and Oahu.

The submarine cable would be laid on the ocean floor along a route approved by state and federal environmental agencies. To the maximum extent possible, the cable would avoid areas with steep slopes and high potential for marine landslides; active faults, scarps and other seismic features; abrupt changes in grade; and extreme weather events. The preferred route would be aligned in such a manner as to avoid environmentally sensitive areas and minimize the crossing of other marine cables (Figure 4). After the preferred interconnection point on Oahu has been determined, Castle & Cooke would finalize the submarine cable route between Lanai and the Oahu interconnection once this location has been determined.

Castle & Cooke is currently considering several turbine models (and manufacturers) ranging from between 1.5 to 3.0 MW but may consider other turbine models as technology advances. Each wind turbine is comprised of three components; the tower, the nacelle, and the blades (Figure 5). The proposed turbine model would be an upwind, fixed-speed turbine with the rotor always facing upwind and turning at a constant rate of speed.

The turbines would be mounted on a tubular steel tower approximately 260 feet in height and 16 feet in diameter and installed on a reinforced concrete foundation. The tower is topped by a housing or nacelle, which includes the main mechanical and electrical components of the turbine. The rotor, which is mounted on the nacelle, consists of three blades up to approximately 300 feet in diameter.

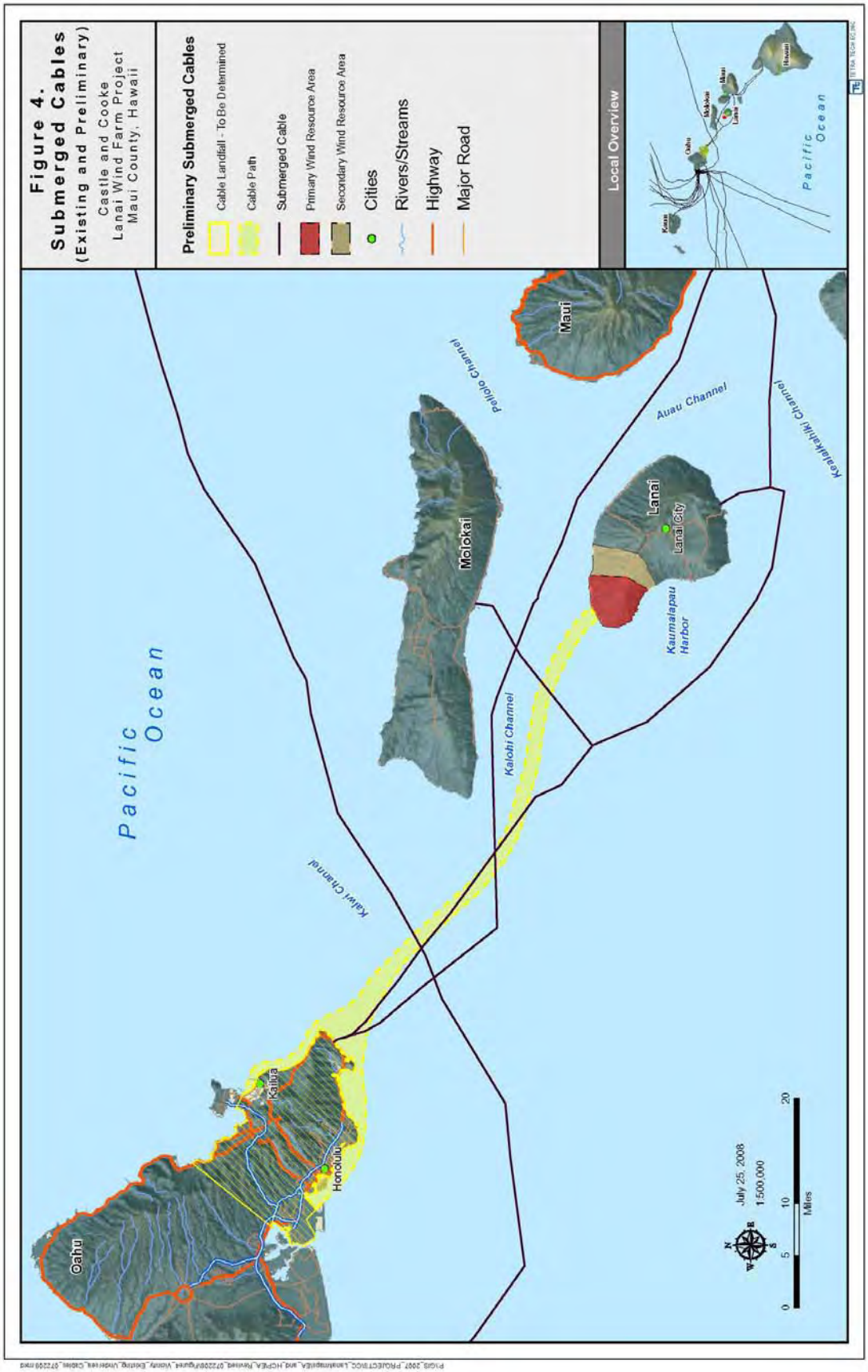
Figure 4.
Submerged Cables
(Existing and Preliminary)
Castle and Cooke
Lanai Wind Farm Project
Maui County, Hawaii
Preliminary Submerged Cables
Cable Landfall - To Be Determined
Cable Path
Submerged Cable
Primary Wind Resource Area
Secondary Wind Resource Area
Cities
Rivers/Streams
Highway
Major Road
Local Overview
Pacific Ocean
Oahu
Kauai
Maui
Molokai
Lanai
Lanai City
Kaunakakai
Kaumalapau Harbor
Honolulu
Kahe
Kalaeloa
Kalohi Channel
Auau Channel
Pailolo Channel
Kaiwi Channel
Keahakahiki Channel
July 25, 2008
1:500,000
Miles
0
5
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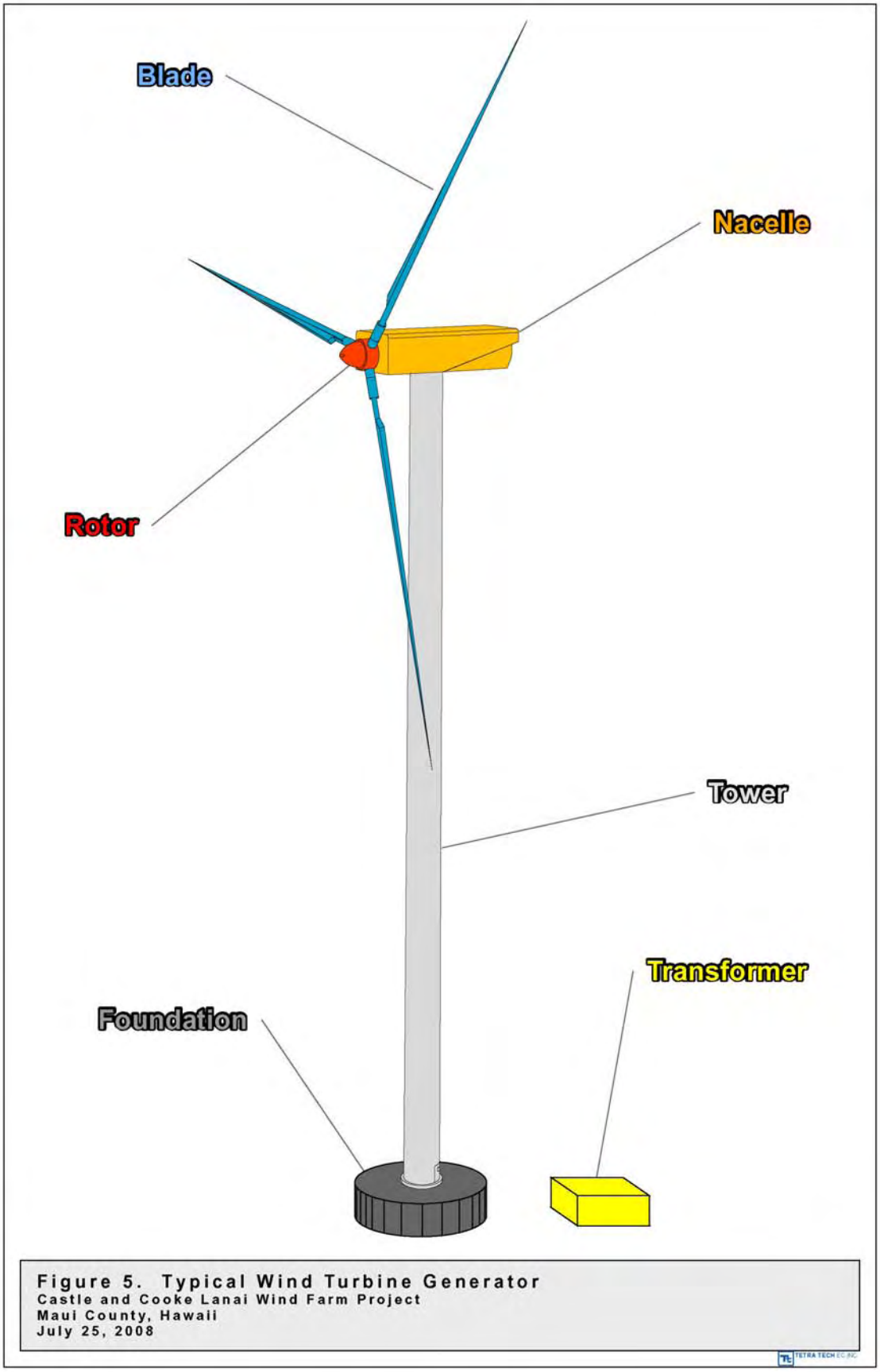

Figure 5. Typical Wind Turbine Generator
Castle and Cooke Lanai Wind Farm Project
Maui County, Hawaii
July 25, 2008

The total height of the turbines from highest arc of the rotor blades would be approximately 410 feet above the turbine base. The actual height depends upon the turbine model ultimately chosen for the project. The wind turbines would begin generating energy at wind speeds as low as 9 miles per hour (mph) and produce full power at wind speeds above 25 mph. At speeds greater than 55 mph, the wind turbine automatically stops operating and remains stationary until the wind speeds drop below 55 mph.

The foundations for the turbines would consist of large reinforced concrete mats of up to 60 feet in diameter. These foundations typically extend 8 to 10 feet below grade. Other infrastructure required as part of the proposed project includes small pad-mounted transformers located at the base of each wind turbine tower; gravel access roads to the turbines; meteorological towers; overhead and underground transmission lines; underground electrical collection cables, substation(s), AC/DC converter station(s) on Lanai and Oahu, an operations and maintenance facility including shops, yard or storage of parts, an office area, and a marine, electrical cable.

2.1 PROJECT LOCATION

The proposed wind generation facility would be located within the primary wind resource area of approximately 12,800 acres (as shown in Figure 2) on the island of Lanai. Castle & Cooke plans to develop the wind energy facilities within the limits of the primary Wind Resource Area (WRA). However, during the design phase it may be necessary to extend the project facilities into the 9,300 acre secondary WRA to avoid impacts to natural or cultural resources, address topographical issues, or to accommodate other design issues. The project would be on privately owned land within the State Conservation District in the northwestern portion of the island, within Tax Map Key (TMK) (2) 4-9-002: 001 (portion). The project area parcels are bounded either by the ocean coastlines or by open lands presently owned by Castle & Cooke. No portion of the proposed project would be located on lands owned by the federal government.

The electricity produced from the proposed wind farm would be transported via one or more submarine cables between the islands of Lanai and Oahu. The cable route and landing areas on Lanai and Oahu would be selected and aligned to avoid environmentally sensitive areas and minimize crossing of other marine cables.

2.2 EXISTING LAND USES

The project area consists of an arid landscape that has been eroded by wind and water runoff. The current land uses is privately owned by Castle & Cooke and opened to the public primarily for hunting under a lease to the State and access to the shoreline for fishing and tourism. All roads into and within the project area are unpaved and in poor to unmaintained condition.

2.3 SURROUNDING GEOGRAPHY

The island of Lanai was formed by a single volcano and covers a land area of 89,756 acres. It is a generally hilly island that rises gradually to 3,369 feet above sea level at Lanaihale or Mount Palawai. The Kalohi Channel separates the island of Lanai from the island of Molokai to the north, and the Auau Channel separates Lanai from the island of Maui to the east.

Lanai is one of the smallest islands in the lower island chain. The local population is approximately 3,000, with the majority of its residents living in or near Lanai City located in the south central part of the island. It is also the local political center of the island.

Lanai City is built in the tradition of the old plantation towns. The city design surrounds Dole Park, which is lined with frontier shops for tourists. On the edge of Dole Park is the Hotel Lanai, a remnant of the island's past plantation era, built in 1923 (Gogobits 2007).

The waters surrounding the island provide habitat for marine mammals, sea turtles, and wildlife dependent on coral reefs. Coral reefs border the Lanai shoreline at several locations. There are still areas of uninhabited beaches and relatively pristine coral reefs.

Much of the terrestrial habitat for biological resources on Lanai has been disturbed by several factors, including the establishment of the Cook Island pine (*Araucaria columnaris*), many years of Dole pineapple plantations, cattle grazing, the release of non-native game species, and the incidental release of non-native terrestrial species such as feral cats (*Felis domesticus*), Norway (*Rattus norvegicus*) and black rats (*Rattus rattus*). All of these factors have negatively impacted much of the native and endemic species and have altered the ecology of the island. Invasive non-native vegetative species common on Lanai include lantana (*Lantana* sp.), Brazilian pepper (*Schinus terebinthifolius*), Australian pine (*Casuarina equisetifolia*), and kiawe (*Prosopis pallida*). However, there are a few areas of native vegetative communities and designated critical habitat for listed plant species within the project area.

2.4 CONSTRUCTION AND ENGINEERING

Based on the site reconnaissance where preliminary geotechnical and geophysical investigations were completed summer 2007, Tetra Tech believes that the proposed wind farm and appurtenant facilities may be satisfactorily designed and constructed within the proposed Lanai project area. Because of the highly variable surficial soil conditions, the high seismic potential throughout the island and the critical support requirements for the wind turbines, extensive geotechnical and engineering site characterization investigations would be required to assess the site-specific conditions. This would be preformed before turbine foundations, building/converter/substation foundations, underground electrical cabling and access roads can be designed and constructed for the project.

2.4.1 Site Conditions

Based on the preliminary site investigations completed during summer 2007, the site conditions within the wind farm area were found to consist predominantly of silty and clayey soils that are the product of extensive weathering of tuff and basaltic materials deposited by volcanic eruptions in the geologic past. Generally, the soils are more extensively and deeply weathered in the higher elevation areas of the site compared to the soils encountered in the lower portions of the site closer to the shore. All of the soils should be capable of supporting the wind turbines and other related structures so long as the site specific conditions are investigated in detail at each location prior to design and construction.

No basaltic lava flow deposits were observed or encountered near the surface or within the erosion gullies and channels. These deposits may exist at greater depths than were observed during the preliminary site investigations but are not likely to be encountered during the

foundation, cable trenching or other intrusive construction activities in the project area. However, in the area near the west tip of the island where the marine cable would exit the island, most likely via a horizontal boring, it is likely that the horizontal boring would encounter relatively unweathered basalt.

In general, no geologic hazards have been identified that would present a problem in the development of the wind energy facility. The project area is within an active seismic zone. This seismic activity is influenced by the volcanic activity in the region and by the project's proximity to the Molokai Seismic Zone. The design of the wind energy facility would incorporate engineering safeguards as required by Maui County building codes. This would mitigate the potential of damages to the turbine and other related equipment caused by seismic activity. The extent and severity of seismic-related constraints would be addressed during the detailed geotechnical investigation.

The wind farm site is arid and on average receives less than 10 to 20 inches of precipitation per year. Because of the fine grained (silt and clay) soil types, the dry conditions, and the lack of vegetation in many areas, dust and erosion control would be required during construction. Best management practices (BMPs) including; watering roads and work areas, silt fencing, collection basins, reseeding and mulching areas as soon as possible following construction activity would be implemented throughout all construction activities to avoid or limit impacts of dust and erosion on run-off to surrounding ocean water quality. If necessary, activities such as grading that inherently disturb large areas of soil would be curtailed or stopped all together during high wind periods to prevent excessive dust from blowing.

2.4.2 Roads

State Highway 440 between Kaumalapau Harbor and Lanai City is in excellent condition. However, after the state maintenance ends near the harbor, the County road would require widening or the hillside on Castle & Cooke property will need to be cut back to allow the transportation of materials and wind turbine components out of the harbor. Existing agriculture roads would have to be upgraded in order to divert construction traffic around the west side of Lanai City and out to the project area via the Polihua Road alignment. Once the main access road reaches the site area in the vicinity of the Garden of Gods, radial turbine string roads would be constructed on ribs of high ground between gullies. Then the wind turbines would be constructed adjacent to these string roads. Impacts to environmental elements as a result of road construction will be assessed in the DEIS.

Road sections would be designed and constructed to accommodate the underlying subgrade soil conditions and loading from heavy construction vehicles used for transportation of turbine components and concrete. It is essential to build roads capable of handling the heavy loads that would be required during construction. Generally, it is expected that the access roads would have a section consisting of compacted subgrade, a geo-textile or geo-grid, and approximately 12 inches of compacted road base aggregate. The existing quarry on the island provides aggregates currently used for the maintenance and construction of the existing roads on Lanai. This quarry is anticipated to provide much of the aggregate for the roads for the wind farm project.

2.4.3 Foundations

Turbine manufacturers require conducting a complete geotechnical investigation with borings at each turbine location. The soils and bedrock vary in texture, compaction, swell potential, and structural characteristics over very short distances. These conditions would require an extensive, site-specific geotechnical investigation to determine the size, shape, and structural requirements for the wind turbine foundations. In addition, at least one boring would be drilled at the associated substation(s), AC/DC converter station(s), the operations and maintenance facility building and at the point where the marine cable would exit the island.

The soil and soft bedrock contains an abundance of cobble to large boulder size, basalt rocks. In the windswept upland areas, these rocks remain on the surface. During foundation excavations for the turbine pads, these rocks would be encountered. As a result, the excavated surface would be uneven and disturbed from the excavation process. Structural backfill would be required to level out the excavated area and provide stable and uniform subgrade support.

Similar conditions may apply to the shallower foundations for the substation, the operation and maintenance facilities, and other associated structures. Adequate foundation support is expected for all these structures, although the variability in conditions would require a need to obtain site specific geotechnical information from each site.

Concrete and structural steel/rebar would be required for the turbine foundations and foundations for all other structures. Because of the large quantity of concrete that would be required (each turbine foundation may contain 350 cubic yards or more of concrete), a batch plant would be established near the site area during construction. The batch plant would require an area of approximately 5 acres to accommodate cement, aggregate, water and equipment. For quality control purposes, it is assumed that the aggregate for the concrete would be imported from outside of Lanai.

2.4.4 Electrical Collection System

Underground cable would run from small "step up" transformers located at the base of the wind turbines back to the site substation(s) or converter station. These cables would generally run parallel to the turbine string roads and would be buried a minimum of 42" below the surface. Collection cables would vary in size from 1000 and 500 MCM to 1/O and 4/O.

2.4.5 Turbine Erection

Turbine erection requires the use of large mobile cranes. Turbine components (tower sections, nacelles, hub and blades.) would be arranged around the turbine base foundation in a manner consistent with the turbine erection sequence. Large track mounted cranes would then be used to erect each turbine in place. Based on wind speeds and delivery constraints, it is expected that 6 to 12 turbines would be erected each week.

2.4.6 Substations, Converter Stations and Transmission Line

One or more substations and a converter station would be located within the project boundaries on Lanai. Energy would be fed from the turbines to the substation(s) then sent

along the transmission line to the converter station where the AC output from the turbines would be converted to high voltage DC. The DC current would be fed to the marine cable and then to Oahu. There, it would be brought to another converter station and substation and ultimately fed into the electrical grid.

2.4.7 Submarine Cable

The submarine cable array would be laid on the ocean floor along a route acceptable to state and federal environmental agencies. To the maximum extent possible, the cable would avoid areas with steep slopes and high potential for marine landslides; active faults, scarps and other seismic features; abrupt changes in grade; and extreme weather events. The preferred route would be aligned in such a manner as to avoid environmentally sensitive areas and minimize the crossing of other marine cables (Figure 4). Preliminary landing point locations on Lanai and Oahu are identified in Figure 4. Once final sites are chosen, detailed environmental and engineering surveys would yield further information to accurately determine specific locations that are the most suitable.

The submarine power system would consist of one or more cables between the islands of Lanai and Oahu. The takeoff point on the Island of Lanai would be in the rocky area west of Polihua Beach, thereby avoiding the turtle habitat of sandy beaches and offshore coral areas. Horizontal directional drilling (HDD) would ensure that the cable does not interfere with shoreline habitats. Marine surveys will be conducted in the vicinity of the selected HDD exit hole (approximately 70+ feet MLLW) to document environmental conditions.

2.4.8 Cable Landings

The landing point on the Island of Oahu would lie between Pearl Harbor and Kaneohe Bay. The cable would come ashore using trenches or through an HDD tunnel. Marine and cultural surveys will also be performed in these areas. Bathymetry data will be used in each case to avoid submarine hazards and steep slopes. Should steep slopes be unavoidable, the cable path would follow perpendicular contours to minimize risk to the cable. In addition to submarine topology, oceanic hazards as defined in the latest NOAA charts were also taken into consideration. These include military zones, buoys and fish aggregation devices, dumping grounds, dredge spoil areas, marine conservation areas and the three nautical mile state jurisdictional boundary. Finally, the location of existing submarine cables played a factor in designing the cable route. Engineers used both the NOAA navigation charts and existing proprietary databases to map the presence of existing cables. To be certain that the cable route would not interfere with military cables, the entire cable route was submitted to the offices of naval command for review. If needed the cable route will be adjusted as necessary to address their concerns.

2.4.9 Construction Logistics

Logistics will prove to be every bit as challenging as construction. Nearly all foundation, electrical and turbine components will need to be brought to the island via barge transport. The harbor in Lanai has been designated as a "Barge Only" harbor which restricts the transportation of materials to much smaller vessels thus adding the number of trips required for project construction. A transportation professional will manage the tasks associated with

this activity. Deliveries of materials and components for the wind farm to the Lanai harbor will need to be coordinated with the island's current suppliers.

2.4.10 Harbor Improvements

The existing Kaumalapau Harbor constructed approximately 80 years ago is small and as noted above only designed for barges limited to approximately 300 feet maximum length. In addition some of the wharf pilings are no longer structurally sound or even founded on bedrock. As a result the central portion of the wharf is restricted to limited loads and could not be used for turbine component off loading. The wharf is state owned but Castle & Cooke is currently studying improvements to the facility and plans to implement those improvements in the near future. These improvements, which include connecting non-bearing piles to bedrock, installing a new fender system, removal and reconstruction of the no-load section of the wharf, and removal of debris from the harbor floor, would increase the efficiency of the facility to accommodate all water-borne traffic.

The harbor would likely be the main limiting factor impacting the rate at which the wind farm can be constructed since it is small and only available on days when scheduled deliveries are not being made. In addition the harbor is subject to closure due to strong southerly winds known as Kona winds. During these occasions large waves and high swell in the harbor and off shore from the harbor prevent barges from using it. Recent improvements to the breakwater at the entrance to the harbor have improved its availability.

The harbor at Manele is not large enough for construction barge traffic and is intended only for recreational and passenger ferry use. It could be used to bring construction personnel to and from Lanai but is not suitable for large turbine components or heavy construction equipment. Additionally, State Highway 440 above Manele is steep with tight curves that would not allow the long trucks carrying turbine blades, nacelles or tower sections to negotiate turns.

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3. DESCRIPTION OF THE AFFECTED ENVIRONMENT/ENVIRONMENTAL IMPACTS

CHAPTER 3
DESCRIPTION OF THE AFFECTED ENVIRONMENT/ ENVIRONMENTAL IMPACTS

This section includes a description of the affected environment and an assessment of the environmental impacts. This preliminary assessment has determined that there is a potential for a significant impacts to one or more natural resources. A full analysis would be completed for the EIS once the final turbine selection has been made and final turbine numbers and locations are identified. An analysis of the impacts of the cable would also be included once the routing has been finalized.

3.1 AIR AND CLIMATE

Lanai receives very little rainfall except in the summit surrounding Lanaihale, where it can receive as much as 35 inches annually. The project area and the remainder of the island receive on average 10 to 20 inches per year with the heaviest rainfall occurring between November and April.

The Hawaiian islands are immersed in the northeasterly trade winds. These trade winds are relatively shallow and capped by a temperature inversion. Therefore, they are easily blocked and channeled by the mountains of the major islands. Such channeling results in excellent winds between the islands, including Pailolo Channel between Molokai and Lanai. Coastal points that are exposed to the channeled winds, such as the project area which is in the northwestern portion of Lanai, are consequently very windy.

Air quality in Hawaii is among the best in the United States and criteria pollutant levels remain well below state and federal ambient air quality standards. The State Department of Health, Clean Air Branch monitors ambient air in Hawaii and has established a statewide system of monitoring stations. The primary purpose of the monitoring stations is to ensure that air quality standards are met (State of Hawaii 2007).

3.1.1 Impacts

Air quality within the proposed project area is excellent. There are no point sources of airborne pollutants, virtually no emissions from vehicles, and persistent trade winds or onshore breezes. Air quality in the vicinity of the Lanai Wind Farm may be only slightly affected by pollutants from occasional vehicular traffic on area roads and from off-road vehicles. The only factor affecting air quality within or immediately adjacent to the project area would be from the temporary operation of construction equipment for the excavation of roads, laying of underground cable, excavation and installation of wind energy turbines, and the excavation and installation of stations and operation and maintenance facilities. During the excavation process, short term fugitive dust may be generated by construction equipment. The release of these particulates would be controlled by wetting down the area while these construction operations are ongoing. Thus, considering the size of the area of impact, the small number of sensitive receptors within the area, and the conditions of exposure during construction, the impacts would not be significant. There would be a beneficial effect in reducing reliance on fossil fuels for generating electricity thereby reducing overall emissions of pollutants and greenhouse gasses.

3.2 BIOLOGICAL RESOURCES

Biological resources include vegetation, wildlife, and unique habitats in the project area of influence. The assessment will include those plants and wildlife species that are limited in number, habitat, or restricted in movement as well as more mobile and wide-ranging species that move onto and off the property from surrounding habitat areas,. These wildlife species may include birds and terrestrial mammals, and marine wildlife (mammals, sea turtles, and marine organisms, including coral) that inhabit the waters surrounding Lanai and within the vicinity of the marine cable. These resources would all be evaluated when they occur adjacent to or in the vicinity of the Region of Influence (ROI).

The ROI for biological resources includes the following:

1. All waters radiating 0.5 mile in all directions around cable-laying vessel;
2. All waters out to 0.25 mile in coastal area where cable comes ashore;
3. The onshore area adjacent to where cable comes ashore; and
4. The entire northwest portion of Lanai and the project operation area.

Vegetation, wildlife, sensitive habitats, and special status species that have been recorded in, or that have the potential to be found within, the project area based on the presence of suitable habitat, would be studied and any potential impacts evaluated. Special-status species are defined as:

- Species listed or proposed for listing as threatened or endangered under the Endangered Species Act (ESA; 50 CFR 17.12 for listed plants, 50 CFR 17.11 for listed animals, and various notices in the Federal Register [FR] for proposed species);
- Species that are candidates for possible future listing as threatened or endangered under ESA (72 FR 10710, March 9, 2007);

- Species that are listed or proposed for listing by the State of Hawaii as threatened or endangered (HRS 195D-4);
- Animal species fully protected in Hawaii;
- Animal species of concern to the DOFAW and the Hawaii Biodiversity and Mapping Program (formerly the Hawaii Natural Heritage Program).

Special-status species are legally protected under Hawaii state law and the ESA. A preliminary list of special-status plant and animal species with the potential to occur within the project area are summarized in Table 9.2 based on review of existing information and coordination with USFWS and DOFAW staff during assessment of the Lanai meteorological towers project.

The USFWS and DOFAW are the agencies responsible for protecting critical habitat as well as threatened and endangered terrestrial plants and wildlife in Hawaii. During the Lanai met tower project, four wildlife species were identified as potentially flying over the project area and that could be impacted by the met towers. These species included Hawaiian petrel, Newell's shearwater, Hawaiian stilt, and Hawaiian hoary bat. A colony of Hawaiian petrels occurs on Lanai at Lanaihale. Newell's shearwaters and Hawaiian hoary bats are not known to breed on the island but only occasional sightings have been recorded. Hawaiian stilts breed at the Lanai wastewater treatment plant located within Lanai City but are not expected to inhabit or regularly fly-over the project area. Development of the HCP for the wind farm will evaluate potential incidental impacts to these species and any others species identified during this process.

The shore area in the ROI provides a suitable beach habitat for some marine wildlife that exit the water, such as sea turtles or monk seals. In addition, near shore coastal waters provide important habitat for several marine wildlife species. The waters that the cable-laying ship would traverse are used by a variety of marine wildlife and are included in the Hawaiian Islands Humpback Whale National Marine Sanctuary (HIHWNMS). All marine mammals are protected by the Marine Mammal Protection Act, and several are also protected under the ESA. All sea turtle species in Hawaiian waters are listed under the ESA. The agency responsible for protecting most marine mammals and sea turtles, and all species in Hawaiian waters, is the National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NOAA Fisheries).

The cable component of the proposed project would take place in waters protected by the National Marine Sanctuary program. The National Marine Sanctuary System consists of 14 marine protected areas that encompass more than 150,000 square miles in the United States. Sanctuaries are established to protect areas that encompass unique or significant natural or cultural features. Specifically, the project ROI falls within the HIHWNMS. This sanctuary is composed of five separate areas abutting six of the major islands. The waters surrounding Lanai, between Lanai and Maui, and between Lanai and Molokai, are all part of the HIHWNMS. This habitat has been designated as a protection ground for humpback whales and their breeding habitat. Hawaii is the only area in the United States where humpback whales mate, calve, and nurse their young.

Table 2.
Special-Status Species with the Potential to Occur in the Project Area

Resource	Status	
	Federal	State
Awalua Ridge tetramolopium (Pamakani) *Tetramolopium remyi*	E	E
Native Yellow Hibiscus (Mao hau hele) *Hibiscus brackenridgei* ssp.*brackenridgei*	E	E
Hidden-petaled Abutilon *Abutilon eremitopetalum*	E	E
Hawaiian petrel (Uau) *Pterodroma sandwichensis*	E	E
Hawaiian coot (Alae keokeo) *Fulica alai*	E	E
Hawaiian stilt (Aeo) *Himantopus mexicanus knudseni*	E	E
Hawaiian duck (Koloa-maoli) *Anas wyvilliana*	E	E
Ou *Psittirostra psittacea*	E	E
Newell's shearwater (Ao) *Puffinus auricular's newelli*	T	T
Ruddy turnstone (Akekeke) *Arenaria interpres*		SoC
White-tailed tropicbird (Koae kea) *Phaethon lepturus*		SoC
Great frigatebird (Iwa) *Frigata minor*		SoC
Hawaiian short-eared owl (Pueo) *Asio flammeus sandwichensis*		SoC
Pacific Golden Plover (Kolea) *Pluvialis fulva*		SoC
Hawaiian Hoary Bat (opeapea) *Lasiurus cinereus semotus*	E	E
Hawaiian Monk Seal *Monachus schauinslandi*	E	E
Humpback Whale *Megaptera novaeangliae*	E	E
Hawksbill sea turtle *Eretmochelys imbricata*	E	E
PacificGreen sea turtle *Chelonia mydas*	T	T
Orange-black damselfly *Megalagrion xanthomelas*	C	C
Lanai tree snail (*Partulina semicarinata*)	C	C
Lanai tree snail (*Partulina variabilis*)	C	C

Status:
E = Endangered
T = Threatened
C = Candidate for Federal listing as endangered or threatened
SoC = Species of concern

Sources: NatureServe 2007, DOFAW 2005

Essential fish habitat (EFH) is defined by the Magnuson-Stevens Fishery Conservation and Management Act of 1976 (Magnuson-Stevens Act), Public Law (PL) 94-265, as amended by the Sustainable Fisheries Act of 1996, PL 104-267 (codified in scattered sections of 16 USC, § 1801 et seq.) EFH refers to those waters and substrate necessary to fish for spawning, breeding, feeding, or maturing. EFH is also inclusive of coral. EFH was designated by the Magnuson-Stevens Act, which calls for direct action to "stop or reverse the continued loss of fish habitats." Certain corals and sponges have been determined to be EFH or habitat areas of particular concern.

EFH exists in the waters of the ROI. Coral and coral reefs have numerous protections and designations as protected habitat. USFWS identifies coral reefs as Category 2 habitats, which are those that are of high value for certain species and that are relatively scarce. Coral reefs are additionally protected by the Environmental Protection Agency as special aquatic sites (40 CFR 230). Also, the State of Hawaii Coastal Zone Management (CZM) program includes coral and coral reefs as part of the valuable coastal ecosystem, and as such, they are protected under the CZM authority. Executive Order (EO) 13089 directs federal agencies "to preserve and protect the biodiversity, health, heritage, and social and economic value of US coral reef ecosystems and the marine environment." The US Coral Reef Task Force was established to guide federal agencies and the public to fulfill the goals of EO 13089. In addition, EO 13158 (Marine Protected Areas and the Northwestern Hawaiian Islands) involves coral, though it has jurisdiction over federal agencies whose purview includes the designation of marine protected areas to expand and strengthen existing areas or to establish new areas, as appropriate. The EO further directs that the efforts to protect important ocean resources would provide for a scientifically based comprehensive system that includes a diverse range of marine ecosystems.

The Nature Conservancy manages a 590-acre Kanepuu Preserve on Lanai. It provides habitat for plants and other biological resources because it contains a dry land forest that is known to include occurrences of native Hawaiian plant species, some of which are rare. Kanepuu Preserve contains the largest remnants of olopua/lama dry land forest in Hawaii and is home to 49 plant species found only here, including three species that are federally endangered: sandalwood (iliahi), Hawaii gardenia (nau), and *Bonamia menziesii*. This preserve is located about six miles northwest of Lanai City, on the island's western plateau (TNC 2007).

3.2.1 Flora

The project area occurs in the "dry tropical forest/tropical low shrublands" ecoregion (National Geographic 2007). Habitat in the ROI is largely eroded and previously disturbed land. A native forest may have once covered most of Lanai, but by the early 1900s, cattle, sheep, and feral goats had destroyed the area (Hirai 1978). For many years, Lanai was predominantly a pineapple plantation or used for raising cattle. The disturbed vegetative communities are now primarily shrub and/or brushland dominated by invasive or non-native plant species.

Today the principal forested area on Lanai is the mountain region, with a great deal of the vegetation consisting of introduced molasses grass (*Melinis minutiflora*), guava (*Psidium*

guajava), Cook pine (*Araucaria columnaris*), and kiawe (*Prosopis pallida*). Rather extensive wind-eroded areas are found in many parts of Lanai, especially in the north end which would comprise the project area.

The coastal areas of the island are covered by introduced koa haole (*Leucaena leucocephala*) and kiawe on the southern and western half. On the northern and eastern half there are more wind-swept and grassy ranges.

Vegetation in the ROI is divided into the following main types or zones:

1. Ridge crest vegetation zone (above 3,000 feet).
2. Native shrub land (includes native or rare plants; can include native grass; found on moderate slopes).
3. Nonnative forest/alien grassland/shrubland (lowland vegetation; aggressive species).
4. Aquatic natural communities (intermittent streams and gulches; any potential estuarine wetlands or muliwai ponds).
5. Coral/coastal communities (coastal region is the shoreline to 16 feet) out from the shoreline. This includes sandy beach and any limestone platform below the waterline and any reef corals or marine algae and includes any benthic invertebrates.
6. Invasive species and disturbed habitat (invasive and noxious weeds).

Critical habitat exists for 37 plant species on Lanai (USFWS 2000), and there are 789 acres (323 hectares) of designated critical habitat in the ROI. Critical habitat for several endangered vegetation species occurs within the proposed project area. Many listed plant species that have occurred historically on Lanai may no longer be present, though some listed species have been documented. These areas of overlap would be surveyed during the appropriate season between November and May for a current status update and evaluation within the project area. The native ohia-lehua (*Metrosideros polymorpha*) and false staghorn fern, or uluhe (*Dicranopteris linearis*), are found only above elevations of 2,000 feet.

3.2.2 Fauna

Threatened, endangered, and/or sensitive wildlife species occur in the ROI, as well as birds protected under the Migratory Bird Treaty Act. No specific reptile or amphibian surveys have been conducted because there are no native terrestrial reptiles or amphibians on the Hawaiian Islands. Endemic birdlife on Lanai was historically abundant (Hirai 1978), even though the native forest of Lanai was much reduced by 1900. By the 1930s, however, the native avifauna had been virtually eliminated, and few bird species are considered to be reliably present. The causes of bird extinctions on Lanai are not known, but most likely include a combination of mosquito-born avian disease, the destruction of the native mountain forest habitat, and invasive species such as goats, deer, feral cats and rats.

Weekly avian point count surveys were conducted to identify the use of the project area by bird species. Additionally, dawn-dusk and nocturnal visual and radar surveys were conducted

to assess the presence of federally and state endangered species flying within the project area such as the Hawaiian petrel, Newell's shearwater, Hawaiian hoary bat, and Hawaiian stilt.

An active colony of Hawaiian petrels was confirmed in 2006 on the Lanaihale ridge. Although the colony was historically known to occur, its status was unknown and expected to have dramatically declined until surveys were conducted by DOFAW in 2006 (Penniman, pers. comm. 2007 and 2008; Duvall pers. comm. 2007). To better understand the potential presence and movement of Hawaiian petrel, Newell's shearwater, and Hawaiian hoary bat within the Wind Resource Area (WRA), Castle & Cooke contracted to have radar and audio-visual surveys conducted within the project vicinity. DOFAW has heard Newell's shearwater calls on occasion during nighttime surveys at the Hawaiian petrel colony on Lanai but breeding at the colony by shearwaters has not been documented. No Newell's shearwaters were observed during the 2007 audio-visual survey or confirmed during the radar surveys on Lanai.

The Hawaiian stilt and Hawaiian hoary bat are two other endangered species that have been documented on Lanai as a result of studies conducted by Castle & Cooke. Although Hawaiian stilts are known to occur in Lanai City at the wastewater treatment plant, they are believed to have a low potential for occurrence in the project area. Only one stilt was observed at a high altitude during the radar survey conducted seasonally throughout 2007 and 2008. Although Hawaiian hoary bat presence has been documented on Lanai, their breeding status is not known. Only occasional sitings of Hawaiian hoary bats have been documented by DOFAW and during the radar study within the project area.

Nineteen bird species were observed during spring and fall avian point count surveys of which most are not native to Hawaii (Table 3). No threatened or endangered species were observed during the avian surveys, although five state species of concern were noted including the short-eared owl, Pacific golden plover, white-tailed tropicbird, ruddy turnstone, and great frigatebird. The Pacific oceanic migratory route is used by the Pacific golden plover, bristle-thighed curlew, ruddy turnstone, wandering tattler, and other shorebirds. The ruddy turnstone, and probably other shorebirds migrating from the islands of the Bering Sea, have an elliptical route that takes them southward via the islands of the central Pacific and northward along the Asiatic coast. Other bird species with potential to occur on Lanai include the wedge-tailed shearwater, Hawaiian coot, Hawaiian duck although habitat may be limited or does not occur (Hirai 1978, USFWS 2007). There are only two endemic forest bird species that may occur on Lanai today: the amakihi, which is unlikely to be found here, and the apapane, which may occur in small numbers outside the project area at Puu Nene and Maunalei-Hauolaa (Hirai 1978, USFWS 2007).

Marine wildlife may inhabit the Pacific waters around and the coastline of Lanai. Numbers and types of animals vary throughout the year, because the distribution and abundance of both marine mammals and sea turtles in Hawaiian waters vary seasonally. Marine wildlife near the island can be seasonal, resident, or transient. The majority of marine mammals in the ROI are transient, occurring sporadically and remaining briefly in the area.

Table 3.
Bird Species Observed During Avian Point Count Surveys and Radar/Audio-Visual Surveys

Scientific Name	Common Name	Survey	Season	Status
Birds				
Acridotheres tristis	common myna	Avian	S/F	
Alauda arvensis	sky lark	Avian	S/F	
Arenaria interpres	ruddy turnstone	Avian	F	
Asio flammeus sandwichensis	short-eared owl	Avian	S/F	
Cardinalis cardinalis	northern cardinal	Avian	S/F	
Carpodacus mexicanus	house finch	Avian	S/F	
Cettia diphone	Japanese bush-warbler	Avian	S	
Francolinus pondicerianus	gray francolin	Avian	S/F	
Fregata minor	great frigatebird	Avian	S	
Geopelia striata	zebra dove	Avian	S/F	
Himantopus mexicanus knudseni	Hawaiian stilt	Radar	S	E
Lonchura malabarica	Indian silverbill	Avian	S	
Lonchura punctulata	nutmeg manikin	Avian	F	
Meleagris gallopavo	wild turkey	Avian	S	
Mimus polyglottos	northern mockingbird	Avian	S/F	
Phaethon lepturus	white-tailed tropicbird	Avian	S/F	
Phasianus colchicus	ring-necked pheasant	Avian	S/F	
Pluvialis fulva	Pacific golden plover	Avian	F	
Pterodroma sandwichensis	Hawaiian petrel	Radar	S	E
Streptopelia chinensis	spotted dove	Avian	F	
Zosterops japonicus	Japanese white-eye	Avian	S/F	

Season: S=spring/summer, F=fall; Status: SoC= state species of concern, E=state and federally endangered

The four island chain, of which Lanai is a part, is considered an important part of the humpback whale wintering grounds. Humpback whales increase in number as their breeding season progresses from December, when their numbers are low, through their peak in mid-February and March. A decline occurs in April when they migrate northward. Scientists estimate that the pre-whaling population of the North Pacific stock of humpback whales numbered approximately 15,000 to 20,000 (HIHWNMS 2007). Of the approximately 7,000 humpback whales currently in the North Pacific, about 5,000 migrate.

Other marine wildlife species with potential to occur in the ROI include a resident spinner dolphin population off the west side of the island. Monk seals, listed as federally endangered, occur in Hawaiian waters and are known to occur on occasion on Lanai or in the surrounding waters. Also, two listed species of sea turtles inhabit waters off Lanai and may occur on the beach: green (federally threatened) and hawksbill (federally endangered). The loggerhead, leatherback, and olive ridley sea turtles are also state and federally listed but are considered incidental occurrences in Hawaii (USFWS 2007)

3.2.3 Impacts

Portions of the project area may overlap with sensitive areas. Several threatened and endangered species may utilize portions of the project area, and the marine cable would cross the Humpback Whale Sanctuary.

The following botanical and wildlife studies have been or will be conducted to assess the existing condition of the project area, to determine potential impacts of project development

on biological resources, and identify mitigation to reduce potential impacts to the extent feasible:

1. Threatened and endangered plants are known to occur in the project area. A botanical field study will be conducted to determine the presence of sensitive plant species within or near proposed wind energy facilities.

2. The Hawaiian petrel and the Hawaiian hoary bat are known to utilize the project area and could be affected through collisions with wind turbines. Collisions by birds and bats with wind turbines, and subsequent mortality, present the greatest potential biological impact. As previously stated, weekly avian point count surveys were conducted in Spring and Fall 2007 to identify the use of the project area by bird species. To better understand the potential presence and movement of Hawaiian petrel, Newell's shearwater, Hawaiian hoary bat, and other species of interest within the WRA, Castle & Cooke conducted radar and audio-visual surveys within the project vicinity. These radar surveys collected data on the movements, behavior, and flight altitudes of the seabirds and bat to estimate fatality rates, exposure risks, and use of the area by these species. The Hawaiian petrel appears to have the greatest potential for impact as a result of this proposed project with the Newell's shearwater, Hawaiian hoary bat, and Hawaiian stilt to a lesser extent based on the results of the initial studies.

3. Impacts to coral reef and other sensitive coastal resources could occur through disturbance from marine cable installation. A review of existing data on coral reef locations and sensitive resources will be conducted to identify a preferred route(s) that would minimize impacts to these resources.

4. Assessments will be conducted along beach areas to determine potential turtle nesting sites or monk seal resting areas. These assessments will be conducted within the vicinity of the proposed marine cable location.

Potential impacts to biological resources within the project area will be evaluated more fully once the results of the studies are finalized and the number and types of turbines to be constructed is known. The DEIS will address and discuss the results of the potential botanical and wildlife impacts from wind farm development. The completed reports may be included as appendices to the DEIS. If necessary, appropriate mitigation measures may be taken based upon the results of those investigations.

3.3 CULTURAL RESOURCES

An archaeological literature review was conducted for major portions of Kaa, Paomai, Kamoku, and Mahana, Ahupuaa, and Lahaina District on the island of Lanai. This literature review was conducted to determine if historic properties may be present within the project acreage, and does not satisfy the requirements for an archaeological inventory survey investigation per the guidelines set forth in HAR Chapter 13-13-276, "Rules Governing Standards for Archaeological Inventory Surveys and Reports."

The scope of work for this review included:

1. Research on historic and archaeological background, including searches of historic maps, written records, and Land Commission Award documents. The research was focused upon the specific project area, with background on the traditional district, and individual *ahupuaa* with special emphasis on settlement patterns.
2. Preparation of a literature review report that includes the following:
    a. A topographic map of the survey area showing all previously identified archaeological sites and site areas;
    b. Historical and archaeological background sections summarizing pre-contact and historic land use as they relate to the archaeological features; and
    c. Recommendations based on all information generated that specify what steps should be taken to mitigate impact of development on archaeological resources with recommendations appropriate to the findings.

Approximately 305 sites were identified in or near the project area and the majority of the project area has not been officially surveyed.

3.3.1 Impacts

The proposed Lanai Wind farm project could have an impact on cultural resources on Lanai. A site-specific archeological and historical resource survey will be conducted for the DEIS to ensure that no previously unidentified cultural resources will be impacted by the construction and operation of the proposed wind farm facility. The DEIS will contain the results of the cultural impact assessment and the complete report will be included as an appendix to the DEIS. If necessary, appropriate mitigation measures may be taken based upon the results of that investigation.

3.4 GEOLOGY, SOILS AND TOPOGRAPHY

3.4.1 Geology

The island of Lanai was formed by a single volcano and covers a land area of about 90,000 acres. It is a generally hilly island that rises gradually to 3,369 feet above sea level at Lanaihale, or Mount Palawai. Lands within the project area are best categorized by Stearns (1940) in his description of the northwest rift zone of Lanai, where he states that the lands rise gradually to the northwest from the Palawai Basin for about six miles, resulting in an area of shallow broad undrained depressions that measure approximately one and a half by three miles wide. These lands are bounded on the northeast by a fault scarp that dies out to the northwestward. The landscape is punctuated by Kanepuu, a massive ridge that rises to an elevation of 1,780 feet above mean sea level.

Surface Geology. The Kauai, Oahu, Maui, Molokai, and Lanai soil survey describes the islands as follows:

> Adjacent to the ocean is a small amount of coral limestone and coral sand. The relief of the islands varies. The once smooth volcanic domes have been

> weathered and eroded. The older islands are deeply dissected where their surface is one of ridges, valleys, and alluvial fans (Sterns and Macdonald 1947).

The surface geology varies greatly across the project area from exposed bedrock to small sandy beaches. The majority of the surficial soils, which are estimated to be approximately 50 percent, consist largely of rocks and boulders with a depth of 4 to 35 inches above bedrock. These soils exist almost uniformly along the sloping elevations from the plateau tending to contain less soil along the steeper elevations where runoff has carved gorges in the earth's surface. The higher elevations along the plateau still contain mostly rocky soil but tend to see a mix of shallow rock and small alluvial sediment deposits in a mixed badlands landscape. These deposits are formed by soils carried by high winds that cross the site and by streams that carry eroded soils from higher elevations. The rock formations in the project area appear to be predominantly a tuff of volcanic ash composition rather than the silica basalt that is prevalent over most of Lanai.

Bedrock Geology. The underlying bedrock of the soils lies from zero to 60 inches below the island surface and is made primarily of Pleistocene-age basaltic lavas. Like other shield volcanoes, Lanai formed from a series of lava flows and dikes. These flows and dikes leave behind very little pyroclastic or fragmented material, and as a result, form relatively uniform layers of lava from 1 to 50 feet thick. The absence of soils intermixed with the lava flows indicates that the Lanai volcano flowed rapidly and steadily during the time in which it was active and that the bedrock is expected to be relatively uniform across the project area.

In addition to the mainly igneous rocks, there are some sedimentary rock deposits on Lanai. These sedimentary deposits are mostly a result of erosion and weathering of the already present igneous rocks, but can also be attributed to deposits from wind and the sea.

Basaltic lava bedrock has been observed to be present near the surface over most of the rest of the island. The only exception is within the former pineapple growing areas in the middle of the island. Along the southern and eastern shores, cliffs of basalt are present as opposed to the relatively uniform slope all the way down to the shoreline in the wind farm area. These cliffs are formed by near surface basaltic lava formations in these areas. On the northern shore, the bedrock was observed to consist mostly of volcanic ash, where there are no cliffs and the land surface slopes more or less uniformly to the shore.

3.4.2 Soils

While the majorities of the soils at the site are extremely rocky and shallow, their exact composition is unknown and can vary significantly over short distances. Visual inspection indicated that the mainly rocky soils referenced by the United States Department of Agriculture, Natural Resource Conservation Service (NRCS) National Cooperative Soil Survey (NCSS) as basalt bedrock compositions may in actuality be tuff deposits of derived volcanic ash like materials with basalt boulders. It may be necessary to further evaluate the composition of the soils, their relative depths, and the properties of the underlying bedrock to assess the impacts to the foundations and roadways. This assessment is crucial in

determining the size, shape, and type of foundations to be used for the proposed wind turbines.

Based on the NRCS soil survey for Lanai and data obtained from the Web soil survey tool. NRCS mapped the project area soils as part of the NCSS. The survey specific to the project area titled Kauai, Oahu, Maui, Molokai, and Lanai was performed in 1972 and was accessed online using the Web Soil Survey tool (USDA 1972) The soils present across the project area were mapped and quantified by area to identify the predominant soil series.

Blown-Out Land. This unit occurs on the windswept, severely eroded areas of Lanai and Molokai. Slopes range from 0 to 15 percent, but small areas as steep as 40 percent are included adjacent to gulches and on hummocks. Most areas are barren and are eroded to the compact subsoil or to soft weathered rock. Runoff is rapid, and the erosion hazard is severe. The subsoil material is similar to that of Kanepuu and Lahaina soils. Elevations range from 1,500 to 1,700 feet.

Koele-Badland Complex. This unit occurs mainly in large gulches and comprises 60 to 80 percent Koele soil and 20 to 40 percent Badland. The Koele series consists of well-drained soils on fans and in drainage ways. These soils formed in alluvium derived from basic igneous rocks. The Koele soil is along the bottoms of gulches on 7 to 20 percent slopes. The surface layer is dark brown silty clay loam about 18 inches thick. The next layer, 30 to more than 40 inches thick, consists of stratified dark brown alluvium that ranges from silty clay loam to coarse sandy loam. The soil is slightly acid to moderately acid. Badland consists of highly weathered rock, mainly along the sides of gulches on 40 to 70 percent slopes. There are a few rock outcrops and scattered stones and boulders. Permeability is moderately rapid, runoff is medium, and the erosion hazard is moderate to severe. Elevation ranges from 1,000 to 2,000 feet.

Lahaina Silty Clay. The Lahaina series consists mainly of well-drained soils on uplands. The soils range in slope from 0 to 40 percent. The depth of soil varies from 0 to 60 inches due to wind and water erosion depending on location and slope. These soils developed from material weathered from basic igneous rock. Typically, the surface layer is dark reddish brown silty clay about 15 inches thick. The subsoil, about 45 inches thick, is dusky red and dark reddish brown silty clay, and silty clay loam elevations range from 10 to 1,500 feet. The soil is moderately acidic in the surface layer and slightly acidic to moderately acidic in the subsoil. Permeability is moderate.

Molokai Silty Clay Loam. The Molokai series consists of well-drained soils on nearly level to strongly sloping uplands at elevations from near sea level to 1,500 feet. The depth of soil varies from 0 to 60 inches due to wind and water erosion depending on location and slope. They formed in material weathered from basic igneous rock. Pebble-size, weathered rock fragments are common in plow layer in cultivated areas. The surface layer is a friable dark reddish brown silty clay loam about 15 inches thick. The moderately compacted subsoil, about 57 inches thick, is dark reddish brown silty clay loam. The soil is slightly acid to neutral throughout the profile. In the areas used for pineapple, the surface layer is commonly very strongly acid or extremely acid. Permeability is moderate. Runoff is slow to rapid, and the erosion hazard is slight to severe.

Rock Land. Rock land is made up of areas where exposed bedrock covers 25 to 90 percent of the surface. The rock outcrops and very shallow soils, commonly four to eight inches deep, are the main characteristics. Slopes range from 3 to 70 percent with an elevation range from near sea level to 3,370 feet. In many places the soil material is very sticky and very plastic, and has high shrink-swell potential.

Stony Blown-Out Land. This unit consists of areas where severe wind and water erosion has occurred, leaving behind stones, boulders, rock outcrop, and soft weathered rock. It occurs on knolls and in gulches and mostly in places where slopes are 7 to 30 percent, but gulch sides as steep as 70 percent are included in small areas of windblown and alluvial material.

Very Stony Land. This unit consists of shallow to deep well-drained stony and boulder soils over weathered rock and bedrock. Soil materials have been stripped from the area by erosion. In a few places, there is a shallow, clayey soil among the rocks and boulders. Slopes range from 7 to 30 percent and elevation ranges from sea level to 1,500 feet.

Very Stony Land, Eroded. This unit consists of large areas of severely eroded and very stony soils over weathered basalt saprolite. About 50 to 75 percent of the surface is covered with stones and boulders. There are common shallow gullies and a few deep gullies. The soil material is like that of Holomua, Molokai, Pamoa, and Waikapu soils. In most places it is less than 24 inches deep to bedrock, but it is deeper in a few low-lying areas. Slopes are mainly 7 to 30 percent, but range from 3 to 40 percent. Elevation ranges from sea level to 1,500 feet.

Waihuna Clay. The Waihuna series consists of well and moderately well-drained soils on nearly level alluvial fans and depressions. These soils formed in old, fine textured alluvium. This soil is difficult to work because it is very sticky and very plastic when wet. The surface layer is about 18 inches thick, dark brown, very sticky and very plastic clay. The next layer, 40 to more than 50 inches thick, is dark brown, very sticky, and very plastic clay and silty clay. This is underlain by relatively soft, weathered pebbles and stones. The surface layer is strongly acidic as a result of past plantings of pineapple. The subsoil is moderately acidic to neutral and elevations are mainly between 1,000 and 2,000 feet. Permeability is moderately slow, runoff is slow, and the erosion hazard is slight.

3.4.3 Topography

The topography within the project area varies greatly. Slopes range from 2 to 55 percent across the site. The highest point on the island is approximately 3,370 feet and is located outside the project area to the southeast. The majority of the flat land of two to five percent slope in the project area is part of a centrally located plateau. This plateau sits at an approximate elevation of 1,700 feet and is located near the central and south central portions of the project area with a narrow contoured strip extending towards the northwest end of the Island.

From this plateau, the elevation slopes in all directions to the Pacific Ocean. Increasingly high cliffs approaching 350 feet make up the majority of the coastline along the southwest portions of the project area from Kaumalapau Harbor to Keanapapa Point. Rolling hills with

steep gorges make up the inland sections to the north and northwest of the plateau. While narrow, low-lying flatland areas and beaches stretch from Palahinu Point to Halulu.

3.4.4 Impacts

Potential impacts to the soil associated with construction of the wind farm project would be erosion and compaction. Potential impacts to the topography would be caused by grading to accommodate roads within the Lanai Wind Farm project area. To the greatest extent possible, improvements will conform to the contours of the land and be confined to the ridgelines, limiting the need for extensive grading of the site. No structures or wind turbines would be located in the ravines or natural drainage areas. Only road culverts, drainage conveyance channels and erosion control structures in roadways that cross ravines would be constructed where necessary. Appropriate engineering, design, and construction practices would be undertaken to minimize potential erosion due to the grading of soils during project development. The potential for impacts to geological resources should be less than significant.

3.5 HAZARDOUS WASTE

A visual survey of the project area shows no indication of constructed facilities. The area is classified as open space within the DLNR Conservation District. But a development this large in scale would involve heavy equipment for the building of roads, the erection of wind turbines, the underground trenching of electrical cables, and the construction of buildings. Thus, there would be a strong likelihood of hazardous materials being used on site during development.

Construction activities would likely require developing a Hazardous Material and Hazardous Waste Management Plan and Spill Prevention, Control, and Countermeasure (SPCC) Plan to provide extensive guidance on hazardous material and hazardous waste management for the proposed wind farm project. The Hazardous Material and Hazardous Waste Management Plan will address the following topics:

1. Responsible personnel;
2. Hazardous material management;
3. Inventory control procedures;
4. Criteria for determining hazardous waste;
5. Accumulation of wastes for conditionally exempt small quantity generators;
6. Storage of hazardous waste;
7. Preparedness and prevention;
8. Emergency spill procedures; and,
9. Specific information on the disposal of various materials/wastes; and hazardous waste minimization.

Implementing this hazardous materials plan would ensure that US Environmental Protection Agency requirements for hazardous waste management and spill contingency are fulfilled at the Lanai Wind Farm project area. The amount of Resource Conservation and Recovery Act-regulated wastes generated may include such materials as waste aerosols, gel-cell batteries, combustible liquid materials, chemicals and paint.

This management plan would comply with applicable federal, state, and local regulations that govern the use of hazardous materials and the disposal of hazardous wastes. The Hazardous Materials Plan would identify emergency contacts, an emergency action plan, organizational roles and responsibilities, site-specific contingency plans, information on hazards analysis, response functions, public information and community relations, as well as information on spill containment and cleanup.

3.5.1 Impacts

With the implementation of The Hazardous Material and Hazardous Waste Management Plan and proper storage and disposal of hazardous waste, the impacts should be less than significant.

3.6 LAND USE

Lanai was formed by a single volcano and covers a land area of about 90,000 acres. The Kalohi Channel separates the island of Lanai from the island of Molokai to the north and the island of Maui by the Auau Channel to the east. Almost all of the island's residents live in Lanai City, which is situated on the central plateau just below Lanaihale, the volcanic peak, which is approximately 3,370 feet above mean sea level. The location of this plantation community was based on the need to make the settlement area accessible to the pineapple fields that formerly extended through the central plateau.

In the 1920s, James D. Dole purchased most of the island of Lanai to grow pineapples on the land. In 1961, these pineapple lands were merged with the assets of Castle & Cooke. Now, approximately 98 percent of the island is owned by Castle & Cooke. Throughout the 1970s, worldwide prices for pineapple continued to drop and competing countries started supplying the market with cheaper pineapple. During the 1980's, Castle & Cooke began a long-term program to phase the island out of pineapple cultivation, and expand the tourism trade on Lanai by building two resorts in 1988 and 1990, respectively. Resort development is concentrated in two areas: at Manele Bay and at Koele, above Lanai City. Kaumalapau harbor is the only commercial harbor on the island and handles the shipment of the majority of the goods and products that support the island's population.

The proposed wind farm would encompass 12,800 acres in the primary WRA and is situated on private land owned by Castle & Cooke in the northwestern portion of the island. Land use within the proposed project area is remote, with a few dirt roads that allow access to the shoreline. On the eastern shore, there are a few homes on small kuleana and other land holdings, but most residents live in Lanai City. The proposed wind farm would be located in both the State Conservation District and State Agricultural District. Kaumalapau harbor is located in the southwestern portion of the island in the State Urban District.

3.6.1 Impacts

Potential impacts are anticipated during construction and operation of the proposed project. The construction phase is anticipated to last at least 12 months and short-term impacts would include clearing land areas to be used as working/laydown areas. New access roads would be created as part of the proposed project because operations and maintenance personnel must have access to all wind turbines. Grading and excavation would be required during the construction of the wind turbines and associated facilities, as well as the under sea portions of the cable. The acreage affected during construction of the project (short-term) will be determined in the DEIS.

Potential impacts are anticipated during operation of the proposed project. Some land would be permanently converted for operation of the wind turbines, substation, and operation and maintenance building. The amount of land that would be utilized for the wind farm, including the associated facilities (e.g., substation, operations and maintenance building) has not been determined. This information will be provided in the DEIS.

3.7 NATURAL HAZARDS

Natural hazards occur and impact all areas along the Hawaiian Islands. These natural disasters include hurricanes, tsunamis, earthquakes, volcanic eruptions and flood events. Devastating hurricanes have occurred twice since 1980; Hurricane Iwa in 1982, and Hurricane Iniki in 1992, and it is likely these events could happen in the future.

3.7.1 Floodplains

Federal Emergency Management Agency maps are not available for the island of Lanai (FEMA 2006). The area proposed for wind turbines does not appear to be located in any major floodplains since they are located along ridges.

Additionally, improvements to existing roads and the port do not appear to be located in any major floodplains. If any component of the wind farm and associated facilities are located in the shoreline or flood area, permits may be required.

Stream flooding on Lanai is caused by the heavy rainfall associated with seasonal storms or as a result of tropical storms and hurricanes. Lanai lies in the rain shadow of Maui and Molokai and as a result, receives less precipitation. On average the island receives between 10 to 20 inches of rain a year. Data on floods caused by rainfall and storm events is limited, but the majority of the project area is located in a relatively low risk part of the island for stream flooding. The exception to this is the low coastal terraces along the northwest tip of the island and the bay areas lying at the stream mouths along the southwest and northern shores outside the project area. At these locations, the risk is moderately high.

3.7.2 Geologic Hazards

In Hawaii, most earthquakes are related to volcanic activity. In other areas of the world, the cause is usually movement between tectonic plates or along faults. Each year, thousands of earthquakes occur in Hawaii due to volcanic activity. These events are so small that they are detectible by only the most sensitive of seismic instruments. But moderate and disastrous earthquakes have shaken the Hawaiian Islands quite violently in the past. In 1938, an earthquake occurred in Maui with a magnitude of 6.8 on the Richter scale. Its epicenter was

located six miles off the north shore of Maui. The earthquake created landslides and forced the road closure to Hana and caused water pipe breaks and earth fractures in Lahaina.

Maui County currently uses the Uniform Building Code (ICBO 1997). Currently, the island uses a UBC Seismic Factor of 2B. The seismic hazard in the Lanai Wind Farm area is moderate and results from the proximity of exiting volcanoes in the region. Active volcanoes in the adjoining islands can also produce moderate earthquakes in association with an impending or active eruption. The percent ground acceleration at the site resulting from the seismic event of each of the US Geological Survey source mechanisms was estimated using information developed by the US Geological Survey in the National Seismic Hazard Mapping Facility and will be used to design wind turbines foundations and ancillary structures.

3.7.3 Tsunamis

Tsunamis are generated by a variety of geologic events. Landslides, submarine faulting, submarine volcanism, and sudden seafloor movements generated from earthquakes can produce tsunamis. Tsunamis can be created by an event occurring thousands of miles away, and high geologic activity occurs in and around the Pacific Ocean; the risk for a tsunami is high. Lanai has experienced 26 tsunami events since 1812. The average return period is seven to nine years with a return period of 23 years for damaging tsunamis. Although Lanai has not experienced a tsunami event since 1960, it is recognized that potential for such an event remains.

The project area is fairly well protected to the southwest of the site because of the high cliffs adjacent to the water. The risk for damage increases as the elevation drops off from the high plateaus to the north and west ends of the project area. The low-lying Kaumalapali Harbor is at a high risk because of its unsheltered location and because of its low-lying elevation. Likewise, the threat of a damaging tsunami is high at the nearby low-lying portions of the project area.

3.7.4 Impacts

The Lanai Wind Farm will be designed to withstand hazards such as earthquakes. There are no known floodplains in the project area. Hurricanes and high winds are potential natural hazards in the projects area but like geologic hazards these will be accounted for in the design of the wind turbines. Tsunami risk is high only in the low-lying portions of the project area. Thus, the risk of loss of human life and destruction impacts from natural hazards for this type of development are minimal.

3.8 NOISE

The Lanai Wind Farm project would have two types of noise impacts: temporary construction-related noise and permanent operations-related noise. Construction noise impacts could affect marine wildlife via ship noise and cable equipment noise at sea, and by way of onshore site operations on the coast. Construction noise may also occur in upland areas associated with road improvements, transmission lines, and tower installation. Operational noise is anticipated to occur near turbine and substation locations.

Operational noise associated with turbines and increased human presence could affect wildlife using the wind generating facility project area. Noise related impacts to marine wildlife depend on the proximity of animals to the ships and drilling rigs during construction. Noise related impacts to birds depend on the proximity of receptors to the turbines and vary with wind speeds.

Noise is generally defined as unwanted or excessive sound. Some land uses are considered more sensitive to intrusive noise than others due to the type of activities involved at the receptor location. Specifically, sensitive human noise receptors normally include residences, schools, libraries, religious institutions, hospitals and nursing homes, daycare centers, and other businesses in the vicinity of the wind farm. Due to the remote nature of this project location, receptors near the Lanai Wind Farm would be limited.

Noise issues associated with wind energy facilities typically include both construction noise and noise associated with its operation. Construction noise is temporary (short term) and consists of increased noise levels associated with construction activities. Generally, noise generated from construction of wind energy facilities has maximum noise levels of 85 to 88 A-weighted decibels (dBA) at a distance of 50 feet. Also, noise would be generated by increased traffic on area roadways. Operational noise (long-term) includes mechanical noise from the gearbox and aerodynamic noise from the rotor blades. Mechanical noise has virtually disappeared from modern wind turbines due to engineering designs that minimize vibrations. Aerodynamic noise results from turbine blades moving through the air. Blade tips and back edges are designed to minimize aerodynamic noise. Noise from moving blades is low frequency, and is therefore less obvious to the human ear. During operation of the wind facility, noise levels would be in the 45 to 50 dBA range at a distance of 1,000 feet.

Noise levels decrease significantly with increasing distance from the turbines. Wind turbines might produce an estimated 45 to 50 dBA at 1,000 feet, and the sound of the natural wind masks the noise generated by the wind turbines at distances greater than 1,000 feet. For example, noise modeling based on the Vestas 1.8-MW turbines indicates that someone standing 0.5 mile from the nearest turbine would experience turbine noise levels of up to 40 dBA, and that a person standing 1.5 miles from the nearest turbine would experience noise levels of up to 35 dbA. To put these noise levels into perspective, noise levels of 30 dBA are comparable to a soft whisper, while noise levels of 40 dBA are typical of those in a library.

3.8.1 Impacts

Currently, the project site is vacant, open land. No significant noise is generated on site, and ambient noise in the area emanates from wind, wildlife, and the infrequent traffic of four wheel drive vehicles along the various access roads in the project area.

The proposed Lanai Wind Farm facility is not expected to have significant impacts on existing noise levels at the project area. The wind turbines would emit noise at levels that will be evaluated in the DEIS and FEIS for any potential impacts on wildlife or human habitation. If necessary, noise mitigation measures will be described in the DEIS for rotor blades, internal transmission gearing, etc., such that noise exposure from the wind turbines would not endanger the health or activities of wildlife or human activities.

Construction activities such as the building of roadways, grading operations, the excavation of footings and foundations, and the erection of building structures and wind towers would create short term noise. The equipment that typically would be used for these operations include pick up trucks, dump trucks, backhoes, excavators, rollers, graders, concrete delivery trucks, hydraulic cranes, fork lifts and water tank trucks. Noise generated from this operation can be mitigated to a degree by having the general contractor insure the machinery is properly muffled during the periods of construction. Once construction is complete, the noise from this operation would no longer exist.

3.9 RECREATION

Natural recreation areas are abundant on Lanai. These areas are primarily located along the beach or shoreline, but there are also some inland areas of varying interests. Many of these areas offer both passive and active recreational opportunities for visitors and residents from hunting during seasonal periods to hiking on dedicated trails. Several areas within the project area include Polihua beach, and other points along the shoreline; and Garden of the Gods; and The Nature Conservancy Kanepuu Preserve (www.alternative-hawaii.com/activity/beach).

From the shoreline, Polihua Beach is located within the project area and is a well-known nesting location for the endangered hawksbill sea turtle. This large, white sand beach is the most difficult beach on Lanai to access and people have good views of the island of Molokai from this beach. During the appropriate season, the beach also offers whale watching with over one and a half miles of white sand. The beach area has high wind and dangerous currents and is not safe for swimming; and surfing is for expert surfers only, which limits the number of recreational users to the beach.

Keahikawelo, also known as Garden of the Gods, is characterized by boulders of varying sizes, shapes, and colors. These formations are the result of thousands of years of wind erosion that created pinnacles and buttes in one remote canyon area. From this area, visitors have views of the Pacific Ocean, the island of Molokai, and on clear days, the island of Oahu. The Garden of the Gods is accessible by bicycle or four-wheel drive vehicles.

Many roads outside of Lanai City and within the project area are not improved for travel, such as those leading to the Garden of the Gods and Polihua Beach. State Highway 440 traverses the island between Manele Bay, Lanai City and Kaumalapau Harbor. This road will provide access between the harbor and the project area.

Kaumalapau Harbor is the main harbor for the island. The area was once a thriving and busy harbor when pineapple exports were strong. Now, the harbor is quiet with only the delivery of supplies each Thursday by barge from Honolulu and biweekly delivery of fuel. The harbor is used as a fishing spot from the dock as well as the nearby rock walls. The Harbor's crystal clear waters attract a few swimmers. A scenic overlook affords dramatic views of the sea, high bluffs, and the jagged 1,000-foot cliffs.

The 590-acre Nature Conservancy Kanepuu Preserve is a dry land forest that is an exclusive home to some of the rarest native Hawaiian plant life. This preserve is located about 6 miles northwest of Lanai City, on the island's western plateau (Figured 3). The Nature

Conservancy states that "several patches of an old, extremely rare Hawaiian dry land forest still remain. This forest region, protected as part of Kanepuu Preserve, represents one of the last remaining examples of a type of forest that once covered the dry lowlands of the main Hawaiian Islands" (TNC 2007).

3.9.1 Impacts

Although vehicle access to the project area is limited to four wheel drive vehicles, pedestrian access is allowed without restriction. The access roads are used by hikers, bikers, beach goers, and walkers to reach there destinations, whether inland or along the shoreline. These access roads and adjacent locations provide views of the island of Molokai and other offshore vistas of interest. Potential impacts are anticipated during construction and operation of the proposed project. During construction, short-term impacts are anticipated for safety reasons. Areas would be temporarily closed while large construction equipment is being used and turbines are being erected.

During hunting season, hunters would be accessing the property to hunt only on the weekends. Castle & Cooke would perform their inspections/maintenance activities during the week so hunting activities can be avoided. In the unlikely event that Castle & Cooke personnel should need to access the towers on a weekend during the hunting season, a protocol would be established that informs those hunting on the property to be aware of staff associated with the towers and for staff to wear reflective gear so they are highly visible to hunters and to not stray far from vehicles.

During construction, Kaumalapau Harbor would be a place of major barge traffic with the wind turbines, crane operations, and other associated equipment on the landward side of the harbor. This may temporarily disrupt a certain level of harbor use by recreational fisherman, boaters, and swimmers during periods of construction (approximately 12 months).

During the short period of cable laying, the near shore waters would be temporarily restricted where onshore cable laying operations will occur. This will be examined further in the DEIS as to its effect on recreational users of the shoreline, swimmers, and small craft activities.

During operation, the project site would not restrict entrance and use of these areas of interest, by foot or by vehicle. Separate roads will be built adjacent to existing roads to accommodate the trucks carrying turbines and other equipment. Fences may be placed around the perimeter of each turbine, and the substation and operations and maintenance building, although this would only minimally restrict access.

3.10 SOCIOECONOMIC

Estimates of Lanai's population during the early years of western contact are unreliable since estimates were usually made by passing ships that never landed on the island. The first reliable census of the island came in 1846, when the population of the island was 616 persons. From this period of time until the twentieth century, the native population on Lanai steadily declined. This rapid demise of the Hawaiian race was due primarily to the introduction of western diseases to a Hawaiian population that had little or no immunity. Between the time of Cooke's arrival in Hawaii in 1778 and the arrival of the first missionaries

in 1820, the native population in Hawaii was reduced by one half. When Emory took his inventory of native Hawaiians in 1921, he counted 50 people on the coast and 52 people on the uplands for a total of 102 people (Maui County 1998).

According to the 2000 U.S. Census, the island of Lanai had a population of 3,164 persons, an increase of 24 percent from the 1990 census (2,400 persons). The county of Maui 2030 General Plan Update for the Countywide Policy Plan estimated a 2005 population projection for residents on the island of Lanai of 3,542 persons. Based on this projection, the total population on Lanai is expected to increase by 12 percent (378 persons).

According to the population estimate for 2006, the county of Maui had a population of 141,320 persons, an increase of about 9 percent from the 2000 census of 128,094 persons. Thus, the population estimate increase for Lanai is an increase of 2 percentage points of growth and inline with county current growth projections of 10 percent.

This slight increase in population throughout the island of Lanai and the county of Maui should not affect the local levels on a permanent basis. Presently, there is one wind farm of 20 wind turbines located on the island of Maui, which serves the local populace. With the construction of this proposed project, the dependency on fossil fuels to provide energy would decrease by at least 10 percent for the Hawaiian Islands.

The present continuing construction of additional residential and luxury housing projects has created jobs for the people of Lanai, with a resulting unemployment rate for the island of 1.4 percent (Department of Labor and Industrial Relations 2007). With the addition of a wind farm, more jobs should become available.

3.10.1 Impacts

The proposed project would be located mostly in a Conservation District where urban and rural populations are prohibited, and where no housing developments can occur.

The population on the island of Lanai would change very little as a result of project construction. On a short term basis, the project would support construction related activities. This would require employment of labor likely away from the island of Lanai and/or provide a source of construction jobs for the local residents. Temporary construction-related jobs filled from off the island would last approximately 6 to 12 months, but during that time workers would most likely stay in trailers near the project area, eat at local restaurants, and purchase other amenities such as gas and groceries, all having a beneficial impact on the local economy. It is assumed that approximately one-third of the construction workers would be local residents, the remaining workers would temporarily relocate to the area. It is anticipated that the proposed project would have a long-term impact on the region's economy by providing renewable resource energy to the Hawaiian Islands.

In the long-term, positive impacts include a boost in the local economy from an increase in disposable income and the use of alternative energy sources for future electricity needs. Direct employment may occur from the need of skilled and semi-skilled labor necessary to operate, supervise, repair and maintain equipment that would be involved in the

construction activities. Because of the proposed project, limited in-migration is expected for permanent operations and maintenance employment. It is anticipated that the number of new permanent residents resulting from project operations would be small. This number is anticipated to be insignificant relative to the total population of the island. The number of construction workers and operation workers has not been determined. This information will be provided in the DEIS.

The production of renewable energy for Lanai and other islands will help to meet State and County goals for reducing greenhouse gas emissions and lower fossil fuel dependency, and move towards a sustainable and self sufficient Hawaii.

3.11 INFRASTRUCTURE/UTILITIES

Infrastructure on Lanai consists of a limited network of roads in good to poor condition. On-site infrastructure improvements are required and planned with regard to the Lanai Wind Farm. In order to construct these on-site improvements, the design would be consistent with high quality engineering practices that are environmentally sensitive to the existing land use.

No off-site improvements are required or planned with regard to the proposed Lanai Wind Farm.

3.11.1 Transportation Facilities

There are two highways that are located on Lanai. These are State Highway 44, is also called Keomuku Road and Highway 440, better known as the Kaumalapau Highway. New roads would be constructed to support the wind park development. All other roads in the project vicinity are unimproved and used only for four wheel drive vehicles.

Impacts. The Lanai Wind Farm project site is currently vacant. The proposed project may cause traffic to increase slightly on roads that access the properties due to potential tourists visiting the site. While some of the existing roads and jeep trails may be utilized by members of the public, essentially the land within the project area are landlocked by the coastline. Once the wind farm facility is built, the existing roads and jeep trails that traverse these properties would remain in private ownership. After construction, traffic on these improved roads may increase somewhat, depending on future land uses such as open space recreational uses and the operation and maintenance of wind turbines. Impacts are not expected to be significant.

3.11.2 Water Supply Facilities

Castle & Cooke owns and operates the water supply system on Lanai. The water system includes wells, storage, and distribution facilities to service the developed areas of the island. During the preliminary engineering phase of the project, any improvements or additional services to the water system facility will be identified. These plans are ongoing and will be discussed in the DEIS.

Impacts. The Lanai Wind Farm lands are currently vacant. The proposed project may lead to an increase in the demand for water in the project vicinity for construction purposes or for proposed structures on the properties. These plans are ongoing and will be discussed in the DEIS.

3.11.3 Wastewater Facilities

There are no wastewater treatment facilities in the vicinity of the proposed project site.

Impacts. The proposed action itself would not cause an increase in the demand for wastewater treatment. Likely, the substations and operations and maintenance buildings would be served by individual septic tanks, as regulated by the State Department of Health. These plans are ongoing and will be discussed in the DEIS.

3.11.4 Drainage Facilities

The project area contains many gulch or ravine areas but it does not contain, or lie within, a flood zone. Slopes within the lands of the project area vary in the percent of slope as disclosed in the Geology section, with the trend downward to the coastline. The majority of the project site is flat land of two to five percent slope and is part of a centrally located plateau. The permeability of the natural ground surface varies because the sloping elevations from the plateau tend to contain less soil along the steeper elevations where runoff has carved gorges in the earth's surface.

Impacts. The proposed project is not expected to affect area drainage. It is possible that runoff from the new roadway may influence drainage but proper design of open channel conveyance systems and collection basins would result in minimal impact on both surface water quality and runoff control.

3.11.5 Solid Waste Disposal Facilities

There is a landfill on Lanai outside Lanai City and the project area.

Impacts. The proposed Lanai Wind Farm would have no direct affect on county solid waste disposal facilities. Solid waste that would be generated from the construction of roads, buildings and infrastructure would be properly disposed of at a solid waste facility. These plans are ongoing and will be discussed in the DEIS.

3.12 VISUAL AND AESTHETICS

The natural beauty of the islands of Hawaii is universally recognized and considered to be a significant and valuable asset. Various areas within the proposed project area offer views of the ocean, the upper slopes and summit of ridgelines, and the open areas of the dry land that descends to the coast.

Potentially sensitive viewing areas and special land uses near the proposed project area include Polihua and Shipwreck beaches, and other points along the shoreline, portions of the Munro Trail and Garden of the Gods, and The Nature Conservancy Kanepuu Preserve. Other sensitive viewing areas and special land uses potentially within a five-mile radius of the proposed project or secondary area include Lanai City, Dole Park, and other popular places on the island. Additionally, there are a few historic sites located within the project area and in the surrounding area.

The visual setting of the project area is remote, with a ridge running down the center of the site. From the ridge, there are several tributaries that run to the ocean. Visual sensitivity is dependent on viewer attitudes, the types of activities in which people are engaged when

viewing the site, and the distance from which the site would be seen from different view points. Higher degrees of visual sensitivity are correlated with areas where people live, where they are engaged in recreational outdoor pursuits, or where they participate in scenic or pleasure driving. Conversely, visual sensitivity is considered low to moderate in industrial or commercial areas where the scenic quality of the environment does not affect the value of the activity.

The turbines most likely would be arranged along the higher-elevation ridge within the project area. The perceived dominance of the turbines on the landscape depends on the angle of the sun, times of day and year, and weather conditions. This is because the turbines would reflect the sun at different times of the day, depending on time of year and weather conditions. During times of the day and year when the angle of the sun is lower, sunlight striking at a lower angle on the side of the turbines would tend to make them more visible and prominent than when the sun is more directly overhead. Some of the turbines would require lights on top of the nacelle for aircraft safety. This may cause a change in views during the night. Depending on the final location of turbines and the natural topographical arrangement, visual impacts may occur.

Additionally, other nearby islands (e.g., islands of Molokai and Oahu) may be able to view the turbines on Lanai. Reactions to the turbines could vary; some people would prefer the existing visual setting without the turbines. Other people, however, may find them to be an interesting and even aesthetic point of visual interest upon the landscape. Through the state-level EIS process, the state would require an analysis of potential impacts of the proposed facility, if any, on scenic and aesthetic values in the proposed project area.

3.12.1 Impacts

The highest portion of the project area would be located on a plateau 1,700 feet above sea level northwest of Lanai City. The project area would be at a higher elevation than Lanai City and although the wind turbines would protrude from the surrounding landscape they most likely would not be visible from Lanai City. The turbines may be visible from higher areas of the island given their location on the plateaus, and their presence may change the visual character of the island from the current remote dry land. Viewers at the island's highest peak, Lanaihale, would be able to view the turbines. They would also be visible from other viewing points in the northwest portion of the island. This could be a potentially significant impact when seen locally and from afar.

To assess potential impacts, a visual impact analysis will be prepared and may be included as an appendix in the DEIS. It will address possible mitigation measures and viewshed impacts related to the stationing of the wind towers by superimposing model wind turbines to a representative scale onto photographs taken from various vantage points and off site viewsheds.

It is expected that the towers on top of the ridgeline would require lighting for aviation safety which may detract from the views during the night. This will be evaluated through comparative results.

3.13 WATER RESOURCES

The Lanai Wind Farm would be located on northwestern Lanai. This region receives from 10 to 20 inches of rainfall per year, and there are no permanent surface water resources. The majority of the project site is not within a flood prone area. There are no known improved drainage systems within the proposed project area or vicinity. Runoff from the project area would flow down the topographic gradient from the plateau through natural ephemeral drainage courses and eventually be conveyed into the ocean as it does now.

Wind turbine access roads would be surfaced with aggregate, not paved; therefore the roads would not increase the total amount of impervious surface. Thus, there should be no noticeable increase in stormwater runoff. Any change in the quantity of surface water runoff between pre and post development would be negligible because of the shear expansiveness of the project area. Open channel conveyance systems would be engineered to accommodate runoff for both surface water quantity and quality. But, water availability for construction will be separately assessed and based on the local capacity and delivery methods that would be available.

3.13.1 Impacts

Soils in the project area are mostly volcanic silts and clays. These soils become relatively soft and lack structural integrity when saturated with water. During roadway and site construction, temporary erosion control measures would be used to prevent any sediment disturbed during construction from leaving the construction site and impacting adjacent areas. Drainage control designed to keep road subgrade soils as dry as possible would be critical to minimizing repair and maintenance of new roads as well as minimizing water quality impacts.

Mitigation measures during storm events include waddles, collection basins, and silt fencing to capture any soil particulates from entering any intermittent surface water. The techniques or "best management practices" would contain surface flows to prevent degradation to the coastal waters during periods of construction. A separate hydrology study may be performed to properly assess drainage from active construction locations to minimize erosion and water quality impacts. As such, the proposed project is not anticipated to have adverse affects upon the existing hydrologic unit or conditions, adjoining or surrounding properties nor to the ocean waters.

4. RELATIONSHIP TO GOVERNMENT PLANS, POLICIES, AND CONTROLS

CHAPTER 4
RELATIONSHIP TO GOVERNMENT PLANS, POLICIES, AND CONTROLS

This chapter provides an overview of Federal, State, Maui County, and City and County of Honolulu plans and regulatory controls associated with development of the proposed Lanai Wind Farm on Lanai. The proposed project is situated on private land owned by Castle & Cooke in the northwestern portion of the island of Lanai (Figure 2). The land use within the proposed project boundary is a remote and open space region of the island with a few dirt roads allowing access to the shoreline. Seven meteorological towers for wind data readings have been proposed or constructed within the project area and are located on Conservation District lands. The proposed turbines could be located possibly in both Conservation District lands and in Agricultural District lands depending upon the data received from the meteorological towers.

4.1 FEDERAL OVERVIEW

4.1.1 U.S. Fish and Wildlife Service (Endangered Species Act)

The ESA and its implementing regulations prohibit the take of any fish or wildlife species that is federally listed as threatened or endangered without prior approval pursuant to either Section 7 or Section 10 (a)(1)(B) of the Act. Section 9 of the ESA defines take as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct." The term harm refers to any act that actually kills or injures a federally-listed species and has been extended by case law to include significant habitat modification or degradation (50 Code if Federal Regulations [CFR] 17.3). Section 9 also details generally prohibited acts and Section 11 provides for both civil and criminal penalties for violators regarding species federally-listed as threatened or endangered.

ESA Section 4(f) requires the USFWS to develop and implement recovery plans for the conservation and survival of listed species. Recovery plans must describe specific management actions, establish objectives and measurable criteria for delisting, and estimate the time and cost to carry out measures needed to achieve recovery. The USFWS has

developed a recovery plan for the Hawaiian petrel and Newell's shearwater, Hawaiian stilt (Hawaiian shorebirds), and Hawaiian hoary bat (USFWS 1983, 2005, and 1998, respectively).

In 1982, Congress amended the ESA to allow a private applicant to commit a taking that would otherwise be prohibited under Section 9(a)(1)(B). When a non-federal landowner wishes to proceed with an activity that is legal in all other respects, but that may result in the incidental taking of a listed species, an incidental take permit (ITP) as defined under Section 10 of the ESA is required. Incidental take is defined as "take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity." A Habitat Conservation Plan (HCP) must accompany an application for an ITP to demonstrate that all reasonable and prudent efforts have been made to avoid, minimize, or mitigate for the effects of the requested incidental take. The USFWS and National Marine Fisheries Service (NMFS) have joint authority to administer the issuance of an ITP. The Lanai wind farm project falls under the jurisdiction of the USFWS and an HCP and ITP will most likely be required. The goals, criteria, and measures of an HCP and ITP should be consistent with the actions and objectives of the recovery plans for the covered species.

The Section 10 process for obtaining an ITP begins with the development of an HCP by the project applicant. Required contents of an HCP, defined in Section 10 of the ESA, include:

- An assessment of impacts likely to result from the proposed taking of one or more federally listed species.
- Measures the permit applicant will undertake to monitor, minimize, and mitigate for such impacts.
- The funding that will be made available to implement such measures.
- The procedures to deal with unforeseen or extraordinary circumstances.
- Alternative actions to the taking that the applicant analyzed, and the reasons why the applicant did not adopt such alternatives.
- Additional measures that the USFWS may require as necessary or appropriate.

4.1.2 National Environmental Policy Act

The purpose of NEPA is to "encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the Nation." The NEPA requires Federal agencies to evaluate and disclose the effects of their proposed actions on the human environment in a written statement as either an EIS or an Environmental Assessment (EA). An EA is a concise public document that briefly discusses the need for alternatives to an action and provides sufficient evidence and analysis to support a determination of no significant impacts or a determination to prepare an EIS. With respect to HCPs in general, compliance with NEPA is not a direct obligation or requirement of the applicant for the Section 10 permit. However, the USFWS must comply with NEPA when making their decisions on the application and implementing the Federal action of issuing an ITP. Consequently, the appropriate environmental analyses must be

conducted and documented before a Section 10 permit can be issued. Although NEPA requirements include an analysis of impacts to the same species as does the ESA, the scope of NEPA goes beyond that of the ESA by considering the impacts of a Federal action not only on fish and wildlife resources, but also on non-wildlife resources of the human environment such as cultural resources and socioeconomic values.

Projects can be categorically excluded from a higher level of NEPA analysis if their anticipated impacts on the environment are recognized as negligible and any controversy associated with the project is addressed. The USFWS will require that an EIS be prepared to evaluate the potential environmental impacts of issuing an ITP and approving the implementation of the proposed Lanai wind farm HCP. The EIS would identify whether permit issuance and HCP implementation would significantly affect the quality of the human and natural environment.

4.1.3 Migratory Bird Treaty Act

Under the Migratory Bird Treaty Act (MBTA) of 1918, as amended (16 USC 703-712), taking, killing or possessing migratory birds is unlawful. Birds protected under the act include all common songbirds, waterfowl, shorebirds, hawks, owls, eagles, ravens, crows, native doves and pigeons, swifts, martins, swallows and others, including their body parts (feathers, plumes etc), nests, and eggs. A list of birds protected under MBTA implementing regulations is provided at 50 CFR 10.13. Unless permitted by regulations, under the MBTA it is unlawful to pursue, hunt, take, capture or kill; attempt to take, capture or kill; possess, offer to or sell, barter, purchase, deliver or cause to be shipped, exported, imported, transported, carried or received any migratory bird, part, nest, egg or product. The MBTA provides no process for authorizing incidental take of MBTA protected birds. The two seabird species that may be effected by this project are also protected under the MBTA. If a HCP is approved and USFWS issues an ITP to Castle & Cooke for this project, the terms and conditions of that ITP would also constitute a Special Purpose Permit under 50 CFR 21.27 for the take of the Hawaiian petrel, Newell's shearwater, and Hawaiian stilt under MBTA. Therefore, any such take of the two covered species also will not be in violation of the MBTA. Although the MBTA provides for no incidental take authorization, other MBTA-listed birds that are not protected by the ESA and that may be adversely affected by the proposed wind farm would not be covered by any take authorization.

4.1.4 U.S. Army Corps of Engineers (USACE)

The U.S. Army Corps (USACE) regulates activities affecting wetlands and streams through sections 404 and 401 of the Federal Clean Water Act (CWA). Section 404 requires approval through general or individual permits prior to discharge of dredged or fill material into the waters of the United States including: deposition (placement) of fill or dredged material in waters of the United States or adjacent wetlands. Any wetland areas identified as potentially jurisdictional should be avoided in order to prevent impacts to wetlands during construction or operation. Unavoidable disturbance must be mitigated to the satisfaction of the USACE.

Section 10 of the Rivers and Harbors Act (RHA) of 1899 requires a permit prior to the accomplishment of any work in, over, or under navigable waters of the United States (these are generally called the "Section 10 waters"), or which affects the course, location, condition

or capacity of such waters as to impact on its navigable capacity. Waterbodies have been designated as Section 10 waters based on their past, present, or potential use for transportation for interstate commerce. Activities such as dredging and construction of docks, bulkheads and utility lines require review under Section 10 of the Rivers and Harbors Act of 1899 to ensure that they will not cause an obstruction to navigation and are not contrary to the public interest.

4.1.5 National Historic Preservation Act

Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended (16 U.S.C. 40 et seq.), requires Federal agencies to take into account the effects of their actions proposed on properties eligible for inclusion in the National Register of Historic Places. "Properties" are defined herein as "cultural resources", which includes prehistoric and historic sites, buildings, and structures that are listed on or eligible to the National Register of Historic Places. An undertaking is defined as a project, activity, or program funded in whole or in part under the direct or indirect jurisdiction of a Federal agency; including those carried out by or on behalf of a Federal agency; those carried out with Federal financial assistance; those requiring a Federal permit, license or approval; and those subject to state or local regulation administered pursuant to a delegation or approval by a Federal agency. The issuance of an incidental take permit is an undertaking subject to Section 106 of the NHPA.

4.2 STATE OF HAWAII OVERVIEW

4.2.1 Zoning

Land use in Hawaii is regulated by a dual system of state and county laws, under a statewide zoning law. This State Land Use Law (Chapter 205, Hawaii Revised Statutes) establishes an overall framework of land use management whereby all lands in the State of Hawaii are classified into one of four Districts: Conservation, Agricultural, Rural, and Urban. Except for land that is also in the Special Management Area (SMA), the Conservation District is solely under state jurisdiction. This means the county has no jurisdiction over any portion of the project within the State Conservation District. However, the county does have jurisdiction over the remaining state land districts. Pursuant to Chapter 205A Coastal Zone Management, the SMA is the land extending inland from the shoreline as delineated on maps as filed with the authority June 8, 1977, or amended pursuant to Section 205A-23.

Most of the wind farm would be located in the Limited Subzone of the Conservation District land. Under this subzone, wind farms can be approved with a Conservation District Use Permit (CDUP). The submarine cable would fall in the Resource Subzone of the Conservation District and this activity would be considered under the same CDUP. Under HAR §13-5-22, land in the Protective and Limited subzones require a board permit for public purpose uses (P-6), which expressly authorizes under subpart D-2 "transportation systems, transmission facilities for public utilities, water systems, energy generation facilities utilizing the renewable resources of the area (e.g., hydroelectric or wind farms) and communication systems and other such land uses, which are undertaken by non-governmental entities which benefit the public and are consistent with the purpose of the conservation district."

Land that is not designated as State Conservation District, or that falls within the Agricultural District or Special Management Area, would be under county jurisdiction. Those portions of the wind farm that would be located outside of the Conservation District are in an Agricultural District. The county may require a special use permit, and certain ministerial permits and approvals to develop on this land.

4.2.2 State Conservation District: Department of Land and Natural Resources

A majority of the Lanai Wind Farm lies under the jurisdiction of the DLNR. Under DLNR, the Conservation District designated lands are divided into four main subzones; 1) Protective, 2) Limited, 3) Resource, and 4) General. The Protective subzone contains the most land use restrictions while the General subzone is the least restrictive. There is also a "Special" subzone that can accommodate unique projects. A large portion of the wind farm is located in the Limited subzone of the Conservation District. Under this subzone, meteorological towers and wind farms can be approved with a Conservation District Use Application (CDUA) permit.

4.2.3 Conservation District Use Permit for Wind Farm and Associated Facilities

A limited range of uses are authorized within the Conservation District, and most of these require a Conservation District Use Application (CDUA) permit from the Board of Land and Natural Resources (BLNR), a seven-member board appointed by the governor. The proposed wind farm is an identified use within the Conservation District according to Hawaii Administrative Rules§ 13-5-25 Identified land uses in the protective subzone, P-6 PUBLIC PURPOSE USE, (D-2) Transportation systems, transmission facilities for public utilities, water systems, energy generation facilities utilizing the renewable resources of the area (e.g. hydroelectric or wind farms) and communications systems and other such land uses which are undertaken by non-governmental entities which benefit the public and are consistent with the purpose of the conservation district. This use will require a permit from the BLNR. The final decision as to whether to grant or deny the permits lies within the BLNR.

4.2.4 Chapter 195D, Hawai'i Revised Statutes (Endangered Species; Habitat Conservation Plans)

Hawaii Revised Statutes (HRS) Section 195D-4 states that any species of aquatic life, wildlife or land plant that has been determined to be an endangered or threatened species under the ESA shall be deemed so under this State chapter. The 'take' of any endangered or threatened species is prohibited both ESA and this state statute [Section 195D-4(e)]. Similar to the ESA, Section 195D-2 defines 'take' as 'to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect endangered or threatened species of aquatic life or wildlife, or to cut, collect, uproot, destroy, injure, or possess endangered or threatened species of aquatic life or land plants, or to attempt to engage in any such conduct'.

After consultation with the Endangered Species Recovery Committee, the Board of Land and Natural Resources (BLNR) may permit a take otherwise prohibited under Section 195D-4(e) if the take is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. In support of a temporary ITL, an applicant must develop, fund, and implement a BLNR-approved HCP to minimize and mitigate the effects of the incidental

take. The Lanai wind farm will require an ITL and a HCP would be prepared that satisfies both state and federal requirements.

Such take may be permitted provided the following criteria of Chapters 195D-4 and 195D-21 are met:

- The taking will be incidental;
- The applicant, to the maximum extent practicable, will minimize and mitigate the impacts of the take;
- The applicant shall provide adequate funding and/or guarantee that adequate funding for the implementation of the HCP plan will be provided;
- Incidental take will not decrease the likelihood of survival and recovery of the species in the wild;
- The HCP plan will adequately consider the range of species, address potential cumulative impacts on the species, and provide net environmental benefits from such impacts; and
- The BLNR may require the applicant to comply with other identified measures.

4.3 CITY AND COUNTY OVERVIEW

4.3.1 Maui County General Plan

The Maui County General Plan was first adopted in 1980 and later updated in 1990. The plan sets forth goals, directions, and strategies for meeting the long-term "social, economic, environmental and land use" needs of the county. Maui County's current General Plan was adopted to guide development of the county. Included in the General Plan (1990) are several objectives that are related to meteorological towers and wind farms. One objective of the General Plan is "to make Maui County more self-sufficient in its need for non-renewable energy and more efficient in its use of energy" (Section 2.D.1.). The General Plan also includes the following policy: "encourage programs to test the feasibility of alternative sources of energy production" (Section 2.D.1.).

Similarly, in the County of Maui, 2030 General Plan Update, Countywide Policy Plan, Draft February 2007, Section IV, Goals, Objectives and Policies; sub section D. Improve Physical Infrastructure; Objective 3, Utilize renewable and green technologies to make Maui County energy efficient and less dependant on imports, Policy a. reads, "provide incentives that support the use of solar, wind, hydro, agricultural bi-products, and other sources of renewable resources". Both county plan objectives not only support the use of renewable energy resources but support the delivery technologies that provide that energy for its needs.

4.3.2 City and County of Honolulu

The General Plan for the City and County of Honolulu, adopted in 1977, is a comprehensive statement of objectives and policies which sets forth the long-range aspirations of Oahu's residents and the strategies of actions to achieve them. It is the focal point of a comprehensive planning process that addresses physical, social, economic and

environmental concerns affecting the City and County of Honolulu. The revised 1992 edition of the General Plan supersedes all previous editions and includes all changes which were adopted through the end of 1991.

Several areas of concern identified in the General Plan that may be important in the development of this project include the natural environment, transportation and utilities, energy, physical development and urban design and culture and recreation. The General Plan emphasizes energy development, utilization, and conservation that will reduce Hawaii's dependence on outside sources, requires development projects to give due consideration to natural features such as slope, flood, and erosion hazards, water- recharge areas, distinctive land forms, and existing vegetation; encourages compatibility of land uses and specification of certain land uses at particular locations. Cultural, historic and archaeological sites, buildings, and artifacts must be addressed during all phases of project planning and implementation.

Four of the five objectives identified in the General Plan in the area of energy are pertinent to this project. These objectives include:

- To maintain an adequate, dependable, and economical supply of energy for Oahu residents.
- To conserve energy through more efficient management of its use.
- To fully utilize proven sources of alternative energy
- To develop and apply new, locally available energy sources
- To establish a continuing energy information program.

In addition to the General Plan, the City and County of Honolulu has established special management area boundaries and shoreline setbacks that regulate activities that can occur on or adjacent to the shoreline. The City and County of Honolulu's policy is to preserve, protect, and where possible, to restore the natural resources of the coastal zone of Hawaii. Special controls on development within an area along the shoreline are necessary to avoid permanent loss of valuable resources and foreclosure of management options, and to insure that adequate public access is provided to public owned or used beaches, recreation areas, and natural reserves, by dedication or other means. These policies aim to avoid or minimize damage to natural or historic special management area wetlands wherever prudent or feasible; to require that activities not dependent upon a wetland location be located at upland sites; to allow wetland losses only where all practicable measures have been applied to reduce those losses that are unavoidable and in the public interest. (Sec. 33-1.2, R.O. 1978 (1987 Supp. to 1983 Ed.); Am. Ord. 93-74). The City's primary policy is to protect and preserve the natural shoreline, especially sandy beaches; to protect and preserve public pedestrian access laterally along the shoreline and to the sea; and to protect and preserve open space along the shoreline. It is also a secondary policy of the City to reduce hazards to property from coastal floods. The City established standards which generally prohibit within the shoreline area any construction or activity which may adversely affect beach processes,

public access along the shoreline, or shoreline open space pursuant to HRS Chapter 205A, Part III. (Added by Ord. 92-34)

4.3.3 Lanai Community Plan

The Lanai Community Plan is one of nine community plans for Maui County. The plan reflects the current and anticipated conditions of the Lanai region and advances the planning goals, objectives, policies and implementation considerations used to guide decision-making in the region through the year 2010. The Lanai Community Plan provides specific recommendations to address the goals, objectives and policies contained in the General Plan. It recognizes the values and unique attributes of Lanai, in order to enhance the region's overall living environment (Maui County 1998).

The Lanai Community Plan was first adopted by Ordinance No. 1306 in 1983 (Maui County 1998). Included in the Lanai Community Plan are several objectives that are related to meteorological towers and wind farms. The following are the most relevant under the Energy Objectives and Policies: develop incentives to promote the use of alternative energy sources, promote energy conservation and awareness programs, provide electrical generation capabilities which will reliably meet current and anticipated needs, and discourage the use of nuclear energy-based operations on Lanai (Section 3.B.). The implementing actions for energy include developing and adopting "an integrated energy functional plan for the County of Maui that includes, but is not limited to, strategies for energy conservation, reuse of treated wastewater, recycling, reduction in the use of fossil fuels (e.g., through use of solar and wind energy), public education and awareness and other strategies and actions related to transportation and utilities, housing, environment, urban design and economic activity" (Section 3.B.).

4.4 PERMITS

There are several components of the proposed project that would require permitting. Meetings or coordination with several local, state, and federal agencies have been conducted to identify the potential permits or authorizations that may be required for various parts of the proposed project. These agencies include the following: USACE, USFWS, DLNR, DOFAW, NOAA, DLNR Office of Conservation and Coastal Lands, SHPD, Department of Defense, Department of Energy, DBED&T, and Maui County Planning Department. Castle & Cooke has also conducted community meetings regarding the proposed project on Lanai.

Furthermore, Act 207 established a renewable energy facility siting process to expedite the review and action upon state and county permits necessary for the siting, development, construction, and operation of a renewable energy facility of at least 200 megawatts of electricity and established a renewable energy facility siting special fund. This facilitated permitting process will be utilized in permitting the Lanai wind farm project.

Many of the facilities fall within the Limited or Resource Subzone of the State Land Use Conservation District. Therefore, a Conservation District Use Application (CDUA) permit would be required for the wind generating facility covering the locations of the turbines, access roads, electrical collection lines, substation, operations and maintenance facility, cable laying, cable landings, and temporary construction work areas. Permits likely would be

required for public road and port improvements. Also, the submarine transmission cabling would require permits. All aspects of project development would be considered in the same state and federal environmental impact analysis, but the many individual permits would have individual approval processes.

Construction of the wind farm and laying of the submarine cable would likely require compliance with several federal statutes and regulations, such as National Environmental Policy Act, the National Historic Preservation Act, National Oceanic and Atmospheric Administration and the Rivers and Harbors Act. A CDUA permit from the Board of Land and Natural Resources would be required for any use of state Conservation District lands. Other permits would be required and are discussed below.

The need for federal, state, and county permits and/or approvals depends on several factors. These permits would be approved on such issues as final layout, turbine model, land ownership, the type of construction equipment used, the presence of threatened or endangered species or their habitat, jurisdictional determinations made by the USACE, and involvement of other federal agencies. Table 4 identifies potential permits, approvals, and consultations required in conjunction with project development.

Table 4.
Potential Permits and Consultation Summary for a Wind Farm in Hawaii

Agencies	Permits or Coordination That May Be Required
Federal	
U.S. Fish and Wildlife Service, Region 1, Pacific Region, Pacific Islands Office, NOAA Fisheries, Pacific Islands Regional Office	• Section 7, 9, and 10 Consultation under the ESA of 1973 • Incidental Take Permit (ITP) and preparation of HCP if Section 10 Consultation
U.S. Army Corps of Engineers (USACE), Pacific Ocean Division, Honolulu District	• USACE permit for work in navigable waters; • USACE permit for dredge and fill activities in waters of the United States
NOAA Fisheries, Pacific Islands Regional Office	• Notification required and review of any potential incidental impacts in Sanctuary Waters to marine mammals
NOAA, Hawaiian Islands Humpback Whale National Marine Sanctuary;	• Coordination to insure no conflicts
U.S. Coast Guard, 14th District, Waterways Management - Coast Guard Regulations: Hazards to Navigation	• Coordination
*Federal Aviation Administratio*n, Western-Pacific Regional Office	• Coordination - Notice of Proposed Construction or Alteration
U.S. Department of Defense	• Coordination
Various agencies	• National Environmental Policy Act if a federal nexus is determined.
State of Hawaii	
Department of Business, Economic Development, and Tourism; Office of Planning; Coastal Zone Management Program	• Environmental Impact Statement review • Federal Consistency Review, Coastal Zone Management Program
Board of Land and Natural Resources Department of Land and Natural Resources (DLNR) Office of Conservation and Coastal Lands	• Conservation District Use Application/ Permit (Board Permit for wind farm that includes turbines, roads, cable laying, and cable landings)
DLNR, Division of Forestry and Wildlife	• Incidental Take License • Endangered Species Recovery Committee – review and approval of Habitat Conservation Plan prior to issuance of ITL
DLNR, Commission on Water Resource Management	• Stream Channel Alteration/ Diversion Permits (Joint permit with USACE) • Well Construction and Pump Installation
Board of Land and Natural Resources, DLNR, Land Division	• State Ocean Leases, Rights of Entry, and Revocable Permits
DLNR, State Historic Preservation Division	• Burial Sites and Human Remains Program • Historic Site Review
Hawaii Department of Health, Environmental Management Division, Clean Water Branch	• Water Quality Certification under Section 401 of the Clean Water Act (CWA) • National Pollutant Discharge Elimination System General Stormwater Permit under Section 402 of the CWA and preparation of a Stormwater Pollution Prevention Plan • Preparation of a Spill Prevention, Control, and Countermeasure Plan, stormwater

Table 4 (continued).
Potential Permits and Consultation Summary for a Wind Farm in Hawaii

Agencies	Permits or Coordination Required
Hawaii Department of Health Office of Environmental Quality Control	• State Environmental Review of EIS Coordination
Hawaii Department of Transportation	• Oversize and/or Overweight Permit • Routine Construction within a State highway right-of-way
Hawaii Public Utilities Commission	• Power Purchase Agreement with local utility and development of high voltage transmission lines
• **County**	
Maui Planning Department; Lanai Planning Commission; Maui Department of Public Works and Environmental Management, Development Services Administration; *City and County of Honolulu Department of Planning and Permitting*	• Special Management Area Use Permit (Major Permit or Minor Permit) • Shoreline Setback Variance • Building Permit; Grading, Grubbing, and Stockpiling Permit; Driveway Permit

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4.5 LIST OF AGENCIES TO BE CONSULTED FOR THE DEIS

The following agencies and organizations will be consulted in the preparation of the DEIS.

Federal
U.S. Fish and Wildlife Service
U.S. Army Corps of Engineers
U.S. Geological Survey
U.S. Department of Agriculture Natural Resources Conservation Service
U.S. Naval Base Pearl Harbor
U.S. Environmental Protection Agency, Pacific Islands Contact Office
U.S. Coast Guard, 14th Coast Guard District
U.S. Federal Aviation Administration
National Oceanic and Atmospheric Administration
National Marine Fisheries Service

State of Hawaii
Department of Agriculture
Department of Business, Economic Development, and Tourism Land Use Commission
Department of Business, Economic Development, and Tourism, Office of Planning
Department of Defense
Department of Health
Department of Health, Environmental Management Division
Department of Health, Office of Environmental Quality Control
Department of Land and Natural Resources
Department of Land and Natural Resources, Historic Preservation Division
Department of Transportation
Office of Hawaiian Affairs
University of Hawaii, Environmental Center

County of Maui
Department of Planning
Department of Water Supply

Department Public Works and Environmental Management
Department of Parks and Recreation
Fire Department
Police Department
Maui Economic Development Agency

City and County of Honolulu
Department of Planning and Permitting

Public Utility Agencies
Hawaiian Electric Company, Inc.
Hawaiian Telcom

Organizations
Lanaians for Sensible Growth
Nature Conservancy
Sierra Club
Hawaii's Thousand Friends
Land Use Research Foundation
Hawaii Building & Construction Trade Council
Hawaii Farm Bureau Foundation
Life of the Land

Elected Officials
U.S. Senators
U.S. Representatives
State Senator
State Representative
Councilmember
Lanai Planning Commission

5. FINDINGS AND CONCLUSIONS

CHAPTER 5
FINDINGS AND CONCLUSIONS

The components of the proposed Lanai Wind Farm project may have potentially significant adverse impacts. The elements in which adverse impacts may be considered include threatened and endangered species, cultural resources, visual, and water resources. Detailed studies will be conducted to evaluate potential impacts to environmental resources.

The State Department of Business, Economic Development and Tourism, the accepting authority, has determined that the proposed action requires the preparation of an Environmental Impact Statement, based on the significance criteria set forth in Section 11-200-12 of Title 11, Chapter 200, Administrative Rules, State Department of Health. The reasons supporting this determination are described below according to these significance criteria.

1) Involves an irrevocable commitment to loss or destruction of any natural or cultural resource;

Development of the proposed wind farm would require an irrevocable commitment of land resources upon completion. Environmentally sensitive natural resources would be avoided as much as possible. The potential for adverse impacts to existing natural or cultural resources will be assessed in the DEIS. An archeological inventory survey will be conducted for the DEIS to ensure that no previously unidentified cultural resources would be impacted by the construction and operation of the proposed wind farm facility.

2) Curtails the range of beneficial uses of the environment;

The proposed wind farm would create a beneficial use of the area which is presently uninhabited, unused and generally unsuitable for growing crops and supporting human activities.

3) Conflicts with the state's long-term environmental policies or goals and guidelines as expressed in Chapter 344 HRS, and any revisions thereof and amendments thereto, court decisions, or executive orders;

Since the proposed project would involve construction on undeveloped Conservation District lands which contain plants and wildlife species of concern, there may be changes and impacts to the environment which cannot be avoided. While development may conflict with some of the State's long-term environmental policies, goals and/or guidelines, some of the adverse impacts can be mitigated to minimize its effects upon the environment or be offset by the positive benefits of a significant renewable energy resource for the community and State of Hawaii. Further evaluation of the project in relation to the policies and guidelines expressed in Chapter 344 HRS will be discussed in the DEIS.

4) Substantially affects the economic or social welfare of the community or State;

The proposed wind farm would create a long term source of renewable energy which would benefit the local community as well as the State of Hawaii in reducing its dependence on fossil fuels. The project would create a number of short-term and long-term employment opportunities including short-term construction-related jobs and long-term employment opportunities from professional, skilled and other workers required for the maintenance and operation of the wind generation, storage and transmission facilities.

5) Substantially affects public health;

The proposed project is not anticipated to substantially affect public health relative to air and noise quality. Potential air quality impacts would be mitigated by complying with the State Department of Health (DOH) Administrative Rules, Title 11, Chapter 60, Air Pollution. Reducing dependency on fossil fuels could improve air quality. With regard to noise, mitigation measures would be implemented such as the use of properly muffled construction equipment and compliance with State DOH construction noise limits pursuant to the provisions of the State DOH Administrative Rules, Title 11, Chapter 46, Community Noise Control. Water quality impacts may occur during construction, but measures would be undertaken to mitigate impacts as needed to comply with grading and grubbing, water quality certification, storm water permitting and drainage requirements.

6) Involves substantial secondary impacts, such as population changes or effects on public facilities;

No significant adverse impacts on population or public facilities are expected. Any required infrastructure for the construction and operation of the wind farm would be provided by the developer. The project would contribute to the economic self-sufficiency of the State relative to energy generation.

7) Involves a substantial degradation of environmental quality;

The proposed project is not anticipated to have a significant adverse impact upon environmental quality during construction. Construction activities are anticipated to result in short-term impacts to noise, air quality, water quality, and roadway and harbor traffic in the

immediate vicinity. With the incorporation of mitigation measures during the construction period, the project would not result in long-term degradation to this environmental quality.

8) Is individually limited but cumulatively has a considerable effect upon the environment or involves a commitment for larger actions;

The forthcoming DEIS will address the potential direct impacts of the proposed action, as well as the potential indirect and cumulative impacts associated with the project.

9) Substantially affects a rare, threatened or endangered species, or its habitat;

There are several rare, threatened or endangered species of plants and wildlife species in the project area which could be adversely affected by the project. Critical habitat exists for some plant species on Lanai and there are 789 acres of critical habitat within the project area. There is also the 590-acre Kanepuu Preserve in the project vicinity which contains a dryland forest habitat with native Hawaiian plant species. The DEIS will fully describe plant, bird, animal and marine species which may be affected by the construction and operation of the wind farm and the mitigation measures to be undertaken.

10) Detrimentally affects air or water quality or ambient noise levels;

During construction, dust and noise from construction activities would be unavoidable but there are no nearby areas inhabited by humans. Potential air quality impacts would be mitigated by complying with the State Department of Health (DOH) Administrative Rules, Title 11, Chapter 60, Air Pollution. With regard to noise, mitigation measures such as the use of properly muffled construction equipment and incorporation of State DOH construction noise limits pursuant to the provisions of the State DOH Administrative Rules, Title 11, Chapter 46, Community Noise Control are applicable to the project. Water quality impacts would be mitigated by implementing best management practices and storm water management controls during construction and fully complying with State and county grading, drainage and water quality permitting requirements.

11) Affects or is likely to suffer damage by being located in an environmentally sensitive area;

There is some potential for adverse impacts to environmentally sensitive areas from the construction and operation of the wind farm. Federal and state natural resource agencies have been and will continue to be consulted so that needed measures can be undertaken to avoid or minimize impacts to resource sensitive areas any species of concern within the project area.

12) Substantially affects scenic vistas and viewplanes identified in county or state plans or studies;

The wind turbines would have visual impacts on the existing landscape. A visual impact analysis will be undertaken to assess views relative to state and county plans and from public vantage points such as from Lanai City.

13) Requires substantial energy consumption;

The proposed wind farm would consume energy in the course of construction, but in its operational phase would be a significant long term source of clean and renewable power for the islands of Lanai and Oahu.

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CHAPTER 6
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