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# DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

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November 23, 2010

Director
Office of Environmental Quality Control
235 South Beretania Street, Room 702
Honolulu, Hawaii 96813

Dear Director:

Subject: Environmental Assessment / Environmental Impact Statement Preparation Notice to Prepare an Environmental Impact Statement for the Hawai'i Interisland Renewable Energy Program (HIREP) Wind on the Islands of O'ahu, Maui, Moloka'i and Lāna'i.

The attached Environmental Assessment/Environmental Impact Statement Preparation Notice has been prepared pursuant to Chapter 343, HRS and Chapter 200-2, HAR based on our determination that the proposed project may have a significant effect on the environment and will require the preparation of an environmental impact statement. Please publish notice in the next issue of The Environmental Notice on December 8, 2010.

Enclosed are the following items:

- One (1) copy in pdf format and a completed OEQC publication form on CD
- One (1) hardcopy of the EA/EISPN

If you have any questions, please call Allen Kam, DBEDT Project Manager at 808-587-9010.

Sincerely,

Theodore A. Peck
Energy Program Administrator

# HAWAIʻI INTERISLAND RENEWABLE ENERGY PROGRAM: WIND FINAL ENVIRONMENTAL ASSESSMENT/ ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE

***Prepared for:***

State of Hawaiʻi Department of Business, Economic Development and Tourism (DBEDT)

***Prepared by:***

AECOM

November 24, 2010

# PROJECT SUMMARY

| | |
|---|---|
| Project | Hawai‘i Interisland Renewable Energy Program (HIREP): Wind - Programmatic Environmental Impact Statement (EIS) to establish a framework to be followed when analyzing individual project-specific proposed wind projects |
| Applicant | Department of Business, Economic Development and Tourism (DBEDT) State of Hawai‘i, P.O. Box 2359, Honolulu, Hawai‘i 96804, Contact: Mr. Allen G. Kam, Phone: (808) 587-9023 . The U.S. Department of Energy (DOE) will be a co-lead agency with the State for NEPA) |
| Accepting Authority | DBEDT as the State lead agency |
| Location | Island of O‘ahu and Maui County |
| Tax Map Key | To be determined by project-specific proposed wind projects |
| Parcels | To be determined by project-specific proposed wind projects |
| Project Site Areas | Applicable Wind Resource Zones on Maui County, Potential Landing Sites on Maui County and O‘ahu, and Undersea Ocean Cable Corridors from Maui County to O‘ahu |
| State Land Use Districts | To be determined by project-specific proposed wind projects |
| County Zoning | To be determined by project-specific proposed wind projects |
| Special Designations | To be determined by project-specific proposed wind projects |
| Proposed Action | A programmatic analysis of potential wind development in Hawai‘i as one aspect of achieving the goals of the Hawai‘i Clean Energy Initiative (HCEI) to ensure any follow-on project-specific proposed wind projects follow the guidelines specified in this HIREP Wind EIS |
| Associated Actions Requiring Environmental Review | No State environmental trigger has been identified; however, the Applicant and Accepting Authority (DBEDT) is being proactive to ensure any tiered-off project-specific proposed wind projects follow the guidelines specified in the HIREP Wind EIS |
| Required Permits and Approvals | To be determined by project-specific proposed wind projects |
| Parties Consulted | Bureau of Ocean Energy Management, Regulation and Enforcement<br>DBEDT State Energy office, Renewable Energy Branch<br>Department of Hawaiian Home Lands<br>Office of Environmental Quality Control<br>Office of Hawaiian Affairs<br>State Historic Preservation Division, Department of Land & Natural Resources<br>Hawaiian Electric Company<br>National Oceanic and Atmospheric Administration/National Marine Fisheries Service |

| | |
|---|---|
| | U. S. Department of Energy<br>Local cultural interest groups<br>Local State officials |
| Anticipated Determination | Preparation Notice for completion of a HIREP Wind EIS to outline a process for project-specific proposed wind projects to be analyzed consistently in the future |
| Consultant Firm | AECOM, 1001 Bishop Street, 16th Floor, Honolulu, Hawai‘i 96813 |

**Description of the Proposed Action**

This Final Environmental Assessment/ EIS Preparation Notification (EISPN) evaluates the environmental impacts associated with a proposed wind energy generation, transmission, and delivery program. The proposed action is for a programmatic coordinated overview of potential environmental effects associated with wind energy development on Maui County islands and associated transmission to the City and County of Honolulu. This action would implement the Hawai‘i Interisland Renewable Energy Program: Wind (HIREP) in support of the objectives of the Hawai‘i Clean Energy Initiative (HCEI).

Alternatives to be analyzed in the HIREP Wind EIS include the proposed action, which would provide for the implementation of an oversight program to develop up to 400 megawatts (MW) of wind energy on the Maui County islands of Maui, Lāna‘i, and/or Moloka‘i and transmission of that energy to O‘ahu. A range of wind development projects could be pursued under the proposed action, and include varying power capacities and configurations amongst the islands, undersea cable corridors and routes, and locational criteria for landing sites. The HIREP Wind EIS will address scenarios under the proposed action that consider a programmatic approach to all wind energy deriving from a single island in Maui County, i.e., Lāna‘i, Moloka‘i or Maui, and all wind energy deriving from a combination of generation on two or more of the islands in Maui County, along with associated programmatic approaches to cable corridors and routes and landing site locations.

As part of the HIREP Wind EIS evaluation, the wind energy development program would establish policies and best management practices (BMPs) to effectively and efficiently address the consideration of wind energy development activities and would identify minimum requirements for mitigation measures. These programmatic policies and BMPs would be applicable to future wind energy development projects on areas covered by this HIREP Wind EIS; however future tiered-off site specific projects would require their own environmental review. Site-specific concerns and the development of

additional mitigation measures would be addressed in project-specific reviews, as required. This approach will also permit consideration of cultural landscapes over a broader range of areas rather than focusing and limiting cultural considerations on specific areas.

DBEDT, on behalf of the State of Hawai‘i as its energy coordinator, has the lead role for the State in energy planning and policy initiatives to benefit the state economy and its inhabitants. In furtherance of its partnership with DOE in implementing the goals of the HCEI, DBEDT has determined that significant adverse impacts could result in the implementation of the HIREP and is therefore participating in the preparation of this HIREP Wind EISPN as the state lead agency. It is also the joint lead agency with DOE in the federal National Environmental Policy Act (NEPA) document (Programmatic EIS). This joint effort will ensure that the evaluations and presentations contained in the HIREP Wind EIS will comply with the requirements of the State's environmental review process set forth by the Hawai‘i Revised Statutes (HRS) Chapter 343. Because the HIREP Wind EIS requires substantial involvement and approval of more than one agency at both the federal, state, and local levels, the decision was made to prepare a single joint EIS that follows the procedural and substantive guidelines and requirements of both the Hawai‘i Environmental Policy Act (HEPA) and NEPA.

**Discussion of Alternatives**

At this time, there is one alternative to the proposed action (and the scenarios described therein) being analyzed in the HIREP Wind EIS: the no-action alternative, as described below.

No-Action Alternative

Under the no-action alternative, DBEDT would continue administering wind energy development authorizations and approvals in accordance within existing federal, state, and local statutes and requirements. A coordinated overview of potential environmental effects associated with wind energy development would not be developed. Analysis and review of wind energy development applications, including NEPA analyses, HRS 343 analyses, and development of required mitigation measures, would be conducted on a project-by-project basis. As required, individual land use plan amendments, right-of-way grant applications, and other approvals would occur on a project-by-project application basis without the benefit of the overarching, comprehensive analysis provided as envisioned by the HIREP Wind EIS. Under the no-action alternative, it is less likely that the same level of comprehensive and consistent planning, consultation, and mitigation

measures would be implemented on a project-specific basis. Follow-on proposed project-specific wind projects would not necessarily be implemented in a consistent manner, potentially making achievement of renewable energy goals addressed by an interisland wind energy program less efficient or feasible.

**Conclusions**

It is anticipated that the establishment of this program and the subsequent tiered off project-specific proposed wind projects may result in significant impact to the human and/or natural environment. Therefore, in accordance with HRS Chapters 201N and 343, and Hawai‘i Administrative Rules § 11-200, the Applicant intends to prepare an EIS to ensure that any tiered off project-specific proposed wind projects follow the guidelines specified in the Final HIREP Wind EIS so that consistent analyses on those wind projects can be conducted in the future.

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# LIST OF ACRONYMS

| | |
|---|---|
| AC | alternating current |
| ALISH | Agricultural Lands of Importance to the State of Hawai‘i |
| APE | area of potential effects |
| ASL | above sea level |
| BA | Biological Assessment |
| BMP | best management practice |
| BOEMRE | Bureau of Ocean Energy Management, Regulation and Enforcement |
| CFR | Code of Federal Regulations |
| CEQ | Council on Environmental Quality |
| CIA | Cultural Impact Assessment |
| CMP | Comprehensive Management Plan |
| CWA | Clean Water Act |
| CZM | Coastal Zone Management |
| dBA | decibel/sound pressure level |
| DBEDT | Hawai‘i Department of Business, Economic Development and Tourism |
| DC | direct current |
| DHHL | Department of Hawaiian Home Lands |
| DLNR | Department of Land and Natural Resources |
| DOBOR | Division of Boating and Ocean Recreation |
| DoD | U.S. Department of Defense |
| DOE | U.S. Department of Energy |
| DOFAW | Division of Forestry and Wildlife (DLNR) |
| DOH | Hawai‘i State Department of Health |
| EA | environmental assessment |
| EFH | Essential Fish Habitat |
| EIS | environmental impact statement |
| EISPN | environmental impact statement publication notification |
| EO | Executive Order |
| EPA | U.S. Environmental Protection Agency |
| ESA | Endangered Species Act of 1973 |
| FAA | Federal Aviation Administration |
| FMP | Fisheries Management Plan |
| GHG | greenhouse gas |
| GIS | geographic information system |
| HAPC | Habitat Area of Particular Concern |

| | |
|---|---|
| HAR | Hawai‘i Administrative Rules |
| HCEI | Hawai‘i Clean Energy Initiative |
| HDOT | Hawai‘i Department of Transportation |
| HECO | Hawaiian Electric Company |
| HELCO | Hawai‘i Electric Light Company (Hawai‘i County) |
| HEPA | Hawai‘i Environmental Protection Act |
| HIHWNMS | Hawaiian Islands Humpback Whale National Marine Sanctuary |
| HIREP | Hawai‘i Interisland Renewable Energy Program |
| HRS | Hawai‘i Revised Statutes |
| HVDC | high voltage direct current |
| IHMM | Institute for Hazardous Materials Management |
| KOP | key observation point |
| kWh | kilowatt hours |
| MPRSA | Marine Protection, Research and Sanctuaries Act |
| MW | megawatt |
| NAAQS | National Ambient Air Quality Standards |
| NEPA | National Environmental Policy Act |
| NHO | native Hawaiian organization |
| NHPA | National Historic Preservation Act |
| NOAA Fisheries | National Oceanic and Atmospheric Administration/National Marine Fisheries Service |
| NOI | Notice of Intent |
| NPDES | National Pollution Discharge Elimination System |
| NRCS | Natural Resources Conservation Service |
| NREL | National Renewable Energy Laboratory |
| NRHP | National Register of Historic Places |
| O&M | operations and maintenance |
| OAS | Organization of American States |
| OEQC | Office of Environmental Quality Control |
| OPAERA | Military Operation Area |
| OSHA | U.S. Occupational Safety and Health Administration |
| OWITS | O‘ahu Wind Integration and Transmission Study |
| PDC | Pacific Disaster Center |
| PL | Public Law |
| ROI | Region of Influence |
| ROV | remotely operated vehicle |
| SOEST | School of Ocean and Earth Sciences and Technology |
| TMT | Thirty Meter Telescope |
| U.S.C. | United States Code |

| | |
|---|---|
| USACE | U.S. Army Corps of Engineers |
| USDA | U.S. Department of Agriculture |
| USFWS | U.S. Fish and Wildlife Service |
| USGS | U.S. Geological Survey |
| UXO/MEC | unexploded ordnance/munitions and explosives of concern |
| WPRFMC | Western Pacific Regional Fishery Management Council |

# CHAPTER 1.0
# INTRODUCTION

## 1.1 INTRODUCTION

This Hawai‘i Interisland Renewable Energy Program (HIREP) Wind Programmatic Environmental Impact Statement (HIREP Wind EIS) evaluates the environmental impacts associated with a proposed wind energy generation, transmission, and delivery program. The program would produce renewable energy through the use of wind turbine technology on one or more Hawaiian Islands and transfer the electricity generated to another island or islands by means of one or more undersea cables for subsequent transmission and distribution to energy consumers. Implementation of the proposed wind energy program would be a cooperative effort of the U.S. Department of Energy (DOE) and the State of Hawai‘i, represented by the Department of Business, Economic Development and Tourism (DBEDT), to advance the objectives of the Hawai‘i Clean Energy Initiative (HCEI), a partnership between the State of Hawai‘i and DOE with a goal of instituting a fundamental and sustained transformation in the way in which renewable energy resources are planned and used in the state.

DBEDT, on behalf of the State of Hawai‘i as its energy coordinator, has the lead role for the State in energy planning and policy initiatives to benefit the state economy and its inhabitants. As a continuation of its partnership with DOE in implementing the goals of the HCEI, DBEDT is participating in the preparation of the HIREP Wind EIS as a joint lead agency, ensuring that the evaluations and presentations contained in the HIREP Wind EIS will comply with the requirements of the State’s environmental review process set forth by Chapter 343 of the Hawai‘i Revised Statutes (HRS), also known as the Hawai‘i Environmental Protection Act (HEPA) as well as in compliance with the National Environmental Policy Act (NEPA), as implemented by the Council on Environmental Quality (CEQ) Regulations (40 Code of Federal Regulations [CFR] Parts (§§)1500–1508 [1997]) and the guidelines contained in Department of Energy Office of NEPA Policy and Compliance, which establishes procedures for implementing NEPA for DOE actions. The environmental review document will be prepared in compliance with NEPA, 42 U.S. Code (U.S.C.) 4321 et seq., and 10 CFR Part 1021 (DOE’s NEPA Implementation Procedures).

Because the HIREP Wind EIS requires substantial involvement and approval of more than one agency at both the federal and state levels, the decision was made to prepare

a single joint EIS that follows the procedural and substantive guidelines and requirements for environmental review of both DOE and the State of Hawai‘i.

## 1.2 BACKGROUND

### 1.2.1 Energy Dependence

Hawai‘i depends on imported fossil fuel (mostly oil) for over 90 percent of its energy for land, air, sea transportation, and generation of electricity. Hawai‘i has the highest energy dependence on imported oil of any state in the United States and is thereby vulnerable to price increases and changes in oil availability, as more than 96 percent of the crude oil used in the state comes from foreign sources. Importation and use of oil also creates community, economic, and environmental challenges, and contributes to global climate change, which could have substantial effects on the state through future sea level rise. Island electric power generation and distribution were developed independently and individually, with each island’s system isolated from the others, limiting the ability of the state to diversify its generating sources, utilize renewable sources, or transfer power to areas of high electric use.

Within the state, the greatest demand for energy is on the island of O‘ahu where residential, public, and commercial demands are the highest. On the other hand, the greatest available sources of renewable energy are generally on the other islands, in particular Maui, Moloka‘i, Lāna‘i, and Hawai‘i. The state is faced with the increasing challenge of meeting the greatest energy demand on O‘ahu through the development of renewable sources of energy supply on other islands and is seeking to address this challenge through the HCEI.

### 1.2.2 HCEI as a New Paradigm

The State of Hawai‘i has recognized that a new paradigm in energy sources and management is needed to ensure future economic and environmental health of all the islands. Building upon relationships with DOE as an energy development partner, the State embarked on an ambitious program to transition to a sustainable, clean, flexible, and economically vibrant energy future. The vision of the HCEI is “to serve as a global model for creating a sustainable, flexible, and economically vibrant path to a carbon-free energy future.”

On January 31, 2008, the Governor of Hawai‘i, Linda Lingle, signed a Memorandum of Understanding with DOE initiating DOE’s formal involvement in the HCEI. The goal of

the HCEI is to decrease energy demand and accelerate the use of renewable, indigenous energy resources in Hawai‘i in commercial, residential, industrial, utility, and transportation end-use sectors and sets goals and roadmaps “to achieve 70 percent clean energy by 2030 with 30 percent from efficiency measures, and 40 percent coming from locally generated renewable sources.” The HCEI is focused on meeting two objectives: (1) reducing energy use through efficiency; and (2) developing indigenous, renewable energy sources. Some goals for the renewable energy program include:

- Improving energy security by reducing Hawai‘i’s dependence on imported oil;
- Protecting the environment by reducing greenhouse gas (GHG) emissions;
- Providing a backbone for the future development of Hawai‘i’s electrical infrastructure and addition of more renewable energy;
- Bringing investment and jobs in construction of high technology resources; and
- Reducing the amount of money exported to foreign countries for oil ($6 to $7 billion statewide annually).

### 1.2.3 Renewable Energy Sources

Renewable energy is energy that comes from resources that are naturally replenished. Examples of renewable energy that are known to be abundant in Hawai‘i and are available for development include:

- Wind;
- Geothermal;
- Solar;
- Biomass/Biofuel;
- Ocean Thermal Energy Conversion; and
- Wave.

Hawai‘i has abundant local renewable energy resources; it is estimated that Hawai‘i can potentially meet between 60 and 70 percent of its future energy needs from these sources. However, achieving this level of utilization at a market scale would require substantive transformation of the financial, regulatory, legal, and institutional systems

that govern energy planning and delivery within the state. DOE and DBEDT have led an ongoing review by local stakeholders and other federal agencies in identifying energy generation and delivery options that would push the transformation of the state's energy sector toward the HCEI's goals.

This HIREP Wind EIS focuses on wind energy development in Hawai'i. DBEDT proposes to assess the complete range of renewable energy resources present in Hawai'i if and when interest, commercial viability, and technological advances for these other renewable energy sources develop in the future. In the future, as other viable renewable energy resources are considered, they will comply with all applicable federal and state laws. The commercial utilization of the various renewable energy technologies is not mutually exclusive. Wind power and power generated from the other technologies listed above may be seen as a "menu" of potential future alternative energy options to meet demands on O'ahu and the other islands. Implementation of wind power, considered the most commercially viable option for large-scale projects at present, would not diminish the potential for implementing solar, geothermal, or other power types in the future as their economic viability matures.

### 1.2.4 Wind Energy as the Most Viable Near-Term Technology to Meet HCEI Goals

Subsequent to the signing of the HCEI and the passing of HRS § 269, the cooperative partnership of the National Renewable Energy Laboratory (NREL), the Hawaiian Electric Company (HECO), DOE, and the State of Hawai'i invested large amounts of time and effort to investigate solutions for meeting the HCEI's goals.

The transition to a substantial portfolio of alternative energy sources to replace and supplement current electricity generation capacity required a significant initial program to push the transformation forward, anticipating that implementation of the other projects and technologies would follow. As O'ahu is the most densely populated island in the state, with 80 percent of the population, the bulk of the demand for electricity is on that island. However, due to the limited amount of land and limited viable renewable energy resources on O'ahu, it is not possible to meet the HCEI's goals without the benefit of power generation on other islands and interisland transmission connections to transmit that power to O'ahu. In 2008 a study by DOE (HCEI 2008) attempted to evaluate the status and applicability of known alternative energy sources for O'ahu and prioritize recommended projects to achieve the HCEI utilization goals. A complete range of alternative energy resource use scenarios were considered or were already in development for O'ahu, including efficiency improvements, ocean/wave energy,

generation using municipal solid waste, utility-scale solar projects, rooftop solar, wind projects on Oʻahu, and generation using biomass. Wind power from off-island was recognized as a potential source of significant power, but the challenge of transmitting the power to Oʻahu was also recognized.

The combined criteria of feasibility, scalability, and cost limited the potential for contributions of several of these options. To reach the HCEI goals it was necessary to preferentially push forward the most feasible, commercially scalable, economic technology available. Other power types (and local wind power projects) would also contribute to the mix of power generation options for meeting the HCEI goals.

DOE's analysis concluded that, in the near term, electricity generation from wind resources is the most fiscally prudent and technologically feasible form of renewable energy available on a commercial scale, and, in the State of Hawaiʻi, that Maui County (the islands of Maui, Lānaʻi, Molokaʻi and Kahoʻolawe) has the most abundant and viable wind resources on islands located closest to Oʻahu (HCEI 2008). With consultation of various entities and agencies, it was determined that the western and southern shores of Kahoʻolawe and on the northern and southern tips of Hawaiʻi would not be pursued at this time.

### 1.2.5 Wind Resources and the Components of a Viable Wind Power System

Hawaiʻi has wind resources consistent with utility-scale power production. Good-to-excellent wind resource areas are distributed throughout the islands. The largest contiguous areas are located on the western parts of Molokaʻi and Lānaʻi, on the western and southern shores of Maui, and on the northern and southern tips of Hawaiʻi. There are also localized high-wind resource areas on the islands of Kauaʻi and Oʻahu (see Figure 1). Solicitation of interest from private developers was sought by HECO in September 2007 for potential projects to address the identified need for wind power generation. A range of proposals were received and evaluated—one of the major potential projects resulting from these evaluations is the HIREP that contemplates building wind farms on two of the islands in Maui County (Lānaʻi and Molokaʻi), the transmission of the generated power to the island of Oʻahu via an undersea power cable(s), and utility system upgrades on Oʻahu necessary to integrate the variable wind power into Oʻahu's electrical grid (see Figure 2).

The availability of wind energy resources, the State's commitment to the HCEI, and the stated interest of potential wind power infrastructure developers prompted a more

detailed analysis of the economics and benefits of such a development, in the form of the O‘ahu Wind Integration and Transmission Study (OWITS).

### 1.2.6 O‘ahu Wind Integration and Transmission Study

Under the energy agreement signed between the State of Hawai‘i and HECO in October 2008 as part of the HCEI, HECO committed to increasing renewable energy statewide by 1,100 megawatts (MW) (or 40 percent of the total grid demand) by 2030. A major piece of this objective included 400 MW of “Big Wind” added to O‘ahu’s grid from wind power development on Lāna‘i and Moloka‘i transmitted by way of an undersea cable developed with the assistance of the State of Hawai‘i. The Big Wind Agreement defined how the parties could move forward together. Castle & Cooke had previously announced plans to develop a 400-MW wind farm on Lāna‘i. First Wind Hawai‘i, which built and operates the Kaheawa Wind Farm on Maui, had proposed a 300- to 400-MW wind farm on Moloka‘i. Through the “Big Wind” Agreement, both potential wind farm developers agreed to pursue proposed initial projects, each up to 200 MW if possible. The agreement cleared the way for both projects to move ahead to negotiate contracts to sell their energy to HECO on O‘ahu. Negotiations are still underway with no commitments made by either party.

Integrating large amounts of variable renewable energy such as wind into an electrical grid is challenging because of the variability of the power output. Previous “wind integration” studies have been performed to examine the technical aspects of integrating large amounts of wind power into the bulk electrical grids in the United States and Europe. The methodologies and lessons learned from these studies were applied to a study of the O‘ahu grid, which is even more challenging because it has a significantly smaller load. The OWITS (NREL 2010) was composed of several smaller studies and was sponsored jointly by HECO, DBEDT, and DOE. The scope of the OWITS work included the following:

- Identify the technical requirements and configuration for an undersea interisland cable to transmit electricity from large wind generators on Moloka‘i and Lāna‘i to O‘ahu;
- Identify the ancillary services and potential mitigation measures to offset the variable availability of planned wind and solar power generation;
- Evaluate potential modifications to the utilities’ existing conventional generating units to offset the variable nature of wind and solar energy; and

- Change some operational practices and procedures of the utilities, including an evaluation of the potential benefits of wind forecasting, required to operate the island grids with interisland wind integration.

The scenarios analyzed in the OWITS include 200 MW of wind generation on both Molokaʻi and Lānaʻi, with an additional 100 MW of wind and 100 MW of solar generation on Oʻahu. Small amounts of the Molokaʻi and Lānaʻi wind power were assumed available for local consumption on those islands, but the vast majority of wind power would be used for the much larger Oʻahu electrical load. Future integration studies would more specifically address integrating solar energy on Oʻahu and other Hawaiian Islands by building off the results and methodologies of the OWITS. There are no current viable plans to expand solar energy; however, any future consideration and expansion of solar energy project will comply with all applicable federal and state laws.

The conclusion of the OWITS analysis of the Big Wind and undersea cable initiatives under the HCEI agreement is that bringing up to 400 MW of wind-generated power to Oʻahu with an undersea cable, although challenging from both an engineering and environmental permitting aspect, is technically feasible and should be pursued as an important part of the 40 percent renewable HCEI goal.

Since this type of project had never been proposed for implementation, and the project potentially involved the participation of multiple state and federal agencies and stakeholder groups, a comprehensive regulatory and management approach was sought for dealing with the environmental and permitting issues. This has led to the HIREP Wind EIS approach to the environmental review process.

## 1.3 ENVIRONMENTAL IMPACT STATEMENT APPROACH

While the ambitious endeavor of harnessing wind energy on Molokaʻi, Lānaʻi, and/or Maui and transmitting it to Oʻahu serves a public interest established under the HCEI, concerns have been raised by the local communities about the scope of the environmental review process. The initial approach to implementing wind energy infrastructure on these islands proposed separate environmental reviews for each project component when in reality the project was an integrated wind energy generation and delivery system. Under the initial approach, there are community concerns related to the issues of potential project segmentation in evaluating environmental impacts, and concerns related to cumulative environmental and social effects not being captured by using individual environmental documents for different wind project components on each island.

### 1.3.1 Overview

In acknowledging these community concerns and looking to the approaches used in other federal reviews of wind power programs, DBEDT and DOE made a determination to prepare a program-level EIS to assess the more comprehensive wind energy program focused on Maui County and the island of O‘ahu, rather than focus on the smaller individual wind project elements. A programmatic approach was selected because the proposed action is not for a specific project, but rather an action to implement a larger program addressing wind power generation and delivery on a regional scale.

### 1.3.2 Comprehensive Approach under HEPA

While HEPA has no specific guidelines for preparing programmatic environmental documents, the proposed approach of preparing a joint program-level EIS, which provides a framework for the evaluation of future tiered off projects, is similar to that used in preparing the University of Hawai‘i’s Comprehensive Management Plan (CMP) for the Mauna Kea Science Reserve in 2009. In that instance, the University of Hawai‘i prepared a CMP that identified cultural, environmental, biological, physical, and natural resources of the entire Mauna Kea Science Reserve. The CMP required that all future actions, including telescope development, commercial uses, recreational use, and cultural use be consistent with the CMP as well as comply with applicable federal and/or state environmental laws. The University of Hawai‘i also prepared an environmental assessment (EA) for the CMP to comply with the requirements of HEPA.

### 1.3.3 Subsequent Analysis of Tiered Specific Projects under the HIREP Wind EIS

While program-level EIS documents are relatively common on the federal level, limited experience with this type of process has occurred in Hawai‘i. This HIREP Wind EIS is designed to provide agencies and the public an overview of potential development under the auspices of the HIREP. This EIS does not grant any rights or privileges to a specific project; rather, this EIS will set a framework and will identify broad areas of concern (both location and environment) so that a project-specific applicant would have consistent guidelines in place that would allow a more focused evaluation to be made by the public and reviewing agencies.

Subsequent future project-specific applications submitted under the framework of this HIREP Wind EIS (as an example: a wind farm on Lāna‘i plus the undersea power cable

from Lānaʻi to Oʻahu plus electrical distribution system upgrades on Oʻahu) can then proceed as a single project application, evaluated under the guidelines agreed to in this HIREP Wind EIS. Each project-specific application would have to conduct its own environmental review under NEPA and/or HEPA. DOE and State evaluation and acceptance of procedures and Best Management Practices (BMPs) in this HIREP Wind EIS would allow the environmental evaluation process to consider the specific proposal and render a decision in subsequent tiered environmental evaluations (EISs or EAs).

Allowing the EIS/EA evaluations to be tiered (i.e., allowing project-specific future actions to utilize the findings of this HIREP Wind EIS) provides DOE and DBEDT with information necessary to decide whether and how to proceed with future proposed actions. The regulations implementing NEPA encourage agencies to use the "tiering" approach; tiering helps the lead agency focus on the issues that are ripe for decision and exclude from consideration issues already decided or not yet ripe (40 CFR § 1508.28). CEQ guidance encourages the use of programmatic documents and tiering to facilitate systematic informed decision making and reduce unnecessary paperwork, repetition, and delay (40 CFR § 1500.4(i), 1502.4(b,d).

## 1.4 PURPOSE AND NEED FOR THE HIREP WIND EIS

### 1.4.1 Purpose

As described above, while the State would analyze a full range of possible renewable energy projects for future implementation as part of implementation of the HCEI, the proposed action will focus specifically on wind energy power generation and its delivery within Hawaiʻi. Wind energy power generation is but one component of the comprehensive HCEI to reach Hawaiʻi's 2030 goal of 70 percent efficiency improvements and renewable energy. DOE and DBEDT have determined that rather than individually assess applications for wind projects as they are submitted by applicants, it is the more prudent course of action to consider a wind energy program that includes the generation of up to 400 MW of wind energy generated from one or more of the Maui County islands that can be transmitted through an undersea power cable to Oʻahu and necessary utility upgrades on Oʻahu. This initial program has been designated the HIREP. Wind power generation is the alternate energy source that is currently most ready for development at a commercial scale.

The purpose of the HIREP Wind EIS is to define the regulatory framework to move the initial program (the HIREP – Wind) forward; the results of this effort would be used as a

template for evaluating future wind power alternative energy implementation proposals submitted in response to the goals of the HCEI.

### 1.4.2 Need

HIREP is necessary to meet the identified need of improving efficiency, reducing price volatility, reducing fossil fuel dependency, and supporting the development of additional renewable generation in the State of Hawai‘i, consistent with the goals and objectives of HCEI.

## 1.5 AGENCY ACTIONS AND DECISIONS

HEPA requires that government give systematic consideration to the environmental, social, and economic consequences of proposed development projects prior to allowing construction to begin, and also ensures the public the right to participate in planning projects that may affect their community. This proposed wind energy program development potentially affects a broad cross section of the islands' communities, environment, and economy, and it is thus appropriate that the State conduct an environmental review and engage public participation, consistent with current law, regarding its implementation. Although there has been no State environmental trigger identified, the Applicant and Accepting Authority (DBEDT) is being proactive to ensure any tiered-off project-specific proposed wind projects follow the guidelines specified in the HIREP Wind EIS.

Both NEPA and HEPA provide for integrating the requirements of both statutes in terms of process, analysis, public involvement, and documentation (40 CFR 1506.2; HRS 343(f); Hawai‘i Administrative Rules [HAR] 11-200-25). Under these circumstances, NEPA also provides for both the federal and state agency to manage the process and documents cooperatively, so that one process and document meet the requirements of both laws (40 CFR 1501.5).

Unique to Hawai‘i environmental review is the constitutional requirement that government agencies have an affirmative obligation to preserve and protect the reasonable exercise of customarily and traditionally exercised rights of Hawaiians to the extent feasible (Article XII, Section 7 of the Hawai‘i State Constitution, *Ka Pa‘akai O Ka ‘Aina v. Land Use Commission*, 94 Haw. 31 [2000] {*Ka Pa‘akai*}). The State recognizes that the cultural landscapes on each of the affected islands provide living and valuable cultural resources where native Hawaiians exercise traditional and customary practices, including but not limited to hunting, fishing, gathering, and religious access. With this

recognition comes the obligation to preserve and protect those constitutionally guaranteed rights. Accordingly, pursuant to HRS 343, Act 50, a Cultural Impact Assessment (CIA) would be prepared as part of the State environmental review process. The CIA would (1) identify the valued cultural, historical, and natural resources, including traditional and customary practices exercised within the affected areas; (2) identify the potential threats or impacts to these valued resources by the proposed wind program; and (3) establish "feasible actions" or BMPs to be implemented or undertaken when the project-specific tiered EA/EIS is prepared for the specific wind project. This CIA goes beyond the scope of the required National Historic Preservation Act (NHPA) Section 106 consultation and compliance customarily conducted with NEPA compliance activities under DOE programs. All of these elements would be part of the evaluation of the proposed wind energy program.

While the preparation of a program-level EIS evaluation may be commonplace for many federal programs, this is a fairly new concept in Hawai‘i. Thus, DOE and DBEDT will involve the community throughout the development and approval of the environmental documentation through a proactive public outreach plan. The objectives of the public outreach plan are to: (1) listen to the community's concerns; (2) provide accurate and current information about the proposed project; (3) involve the community through traditional (public meetings) and culturally appropriate forums (e.g., "small talk story" individual and group meetings); and (4) seek community participation in the environmental review process.

DOE and DBEDT will employ various tools to inform and engage the community, including: publication of the related documents through the Hawai‘i State Department of Health (DOH), Office of Environmental Quality Control (OEQC) EIS Distribution list and Cultural Assessment Provider list, the newspaper of general circulation on each island; Office of Hawaiian Affairs *Ka Wai Ola*; posting on locations frequented by the local communities; and the establishment of a website dedicated to the HIREP Wind EIS process.

Given the culturally sensitive issues and the subsistence rural communities that may be impacted by the proposed program, DOE and DBEDT will engage in culturally appropriate forums, including but not limited to extensive "talk story" meetings in nontraditional forums; extensive outreach to the native Hawaiian community, organizations, and individuals; and extensive Section 106 consultations with native Hawaiian organizations (NHOs).

## 1.6 ENVIRONMENTAL DOCUMENTATION

The first step of implementing the wind energy program involves the completion of an assessment of the positive and negative environmental, social, economic and cultural impacts of wind energy development; discussion of relevant mitigation measures to address impacts, including cumulative impacts; and identification of appropriate BMPs for wind developments in the future. Analysis of impacts will focus on the likely potential regions where wind farms could be implemented, likely suitable corridors for placing the undersea interisland power transmission cable(s) connecting the source island(s) with O‘ahu, and the general nature of resultant electric system infrastructure upgrades on the receiving island(s) to accept and distribute the wind power.

For a standard project-specific EIS to be completed, project elements need to be at the same level and schedule of development to move forward as a single action. Because one component (e.g., the wind farm) cannot move forward until the undersea cable route is identified and infrastructure upgrades on O‘ahu are undertaken, an alternative approach has been developed that would allow public review of the overall program. To ensure comprehensive analysis of all the various components at various stages of development and to allow optimum public input, DBEDT has chosen to develop a program-level EIS for the implementation of a wind renewable energy program. The HIREP Wind EIS will provide the basis for subsequent project-specific environmental review documents to be prepared in the future for project-specific individual wind energy development projects. This HIREP Wind EIS will act as a framework for subsequent wind energy projects throughout Hawai‘i.

This HIREP Wind EIS does not evaluate project-specific issues and impacts associated with individual wind energy development projects. To address specific impacts of future renewable energy development projects, the State would pursue the development of tiered project-specific EISs/EAs to address individual project components identified in the HIREP Wind EIS as they become ready for decision making. Tiered projects would follow the HIREP Wind EIS guidelines, mitigations, and agreed-upon BMPs as documented in the Record of Decision for the HIREP Wind EIS. By doing so, the preparation and review process can be facilitated for timely and efficient review.

A comprehensive CIA would be prepared in compliance with HRS Chapter 343, Act 50. The CIA would provide sufficient information for DBEDT to adequately address the constitutional requirements as set forth in the Hawai‘i Supreme Court’s decision in *Ka Pa‘akai*.

## 1.7 SCOPE OF ANALYSIS

The HIREP Wind EIS will evaluate temporary, permanent, direct, indirect, and cumulative impacts to the natural, built, and socioeconomic environments that may occur as a result of implementation of future proposed actions. The EIS process is designed to involve the public in the decision-making process. Input from the public, as well as agencies, will be used to evaluate the alternatives and environmental impacts before a final decision is made. In accordance with HRS 343 requirements, DBEDT is initiating the public and agency scoping process to assist in determining the issues to be addressed in the HIREP Wind EIS. This EISPN is the first step in initiating public comments on the proposed action.

The range of issues analyzed in this HIREP Wind EIS will be determined through written comments received during the public review scoping process initiated by publication of the EISPN in the OEQC *Environmental Notice*. Issues and concerns received during the public scoping process for the State EISPN will be taken into consideration during the analysis of the Draft HIREP Wind EIS.

DOE will be publishing a Notice of Intent (NOI) to prepare the HIREP Wind EIS in the *Federal Register* in the near future. The NOI will begin the scoping process for the federal DOE proposed action.

Some Environmental impacts that could occur as a result of implementation of the proposed action or alternatives are evaluated with respect to the following human and environmental resources. Other areas of concern will be identified through the public input process.

- Geologic and Geographic Resources
- Water Resources
- Terrestrial and Coastal Biological Resources, Species, and Habitat
- Marine/Benthic Biological Resources, Species, and Habitat
- Air Quality
- Noise
- Land Transportation
- Airspace Utilization

- Visual Resources
- Marine Transportation, Recreation, and Commerce
- Public Services, Infrastructure, and Utilities
- Cultural and Historical Resources and Compliance with Act 50
- Socioeconomics
- Public Safety and Health
- Natural Hazards, Hazardous Materials, and Unexploded Ordnance
- Land Use
- Climate and Climate Change

## 1.8 INTERGOVERNMENTAL COORDINATION

As part of the Chapter 343/NEPA compliance process, coordination and consultation with appropriate government agencies will be initiated to obtain regulatory input and guidance related to the proposed action. The purpose of this intergovernmental coordination is to ensure that all applicable laws, rules, regulations, and policies have been identified and that the proposed action has been duly analyzed in light of these considerations. The proposed action may require the following decisions and approvals from federal and state agencies.

### 1.8.1 Endangered Species Act, Section 7 Consultation

Consultation with the U.S. Fish and Wildlife Service (USFWS) and the National Oceanic and Atmospheric Administration (NOAA)/National Marine Fisheries Service (NOAA Fisheries) is required under the federal Endangered Species Act (ESA) if the proposed action may affect federally threatened and/or endangered plant and animal species. Federally listed species that are known to occur or have the potential to occur in the proposed programmatic action areas will be determined during consultations with the USFWS and NOAA Fisheries under the ESA. Consultation during the HIREP Wind EIS will establish procedures and protocols for follow-on consultations during project-specific proposed wind projects.

### 1.8.2 Clean Water Act, Section 404 and Section 402

Pursuant to Section 404 of the Clean Water Act (CWA), the U.S. Army Corps of Engineers (USACE) regulates the discharge of dredged or fill material into wetlands and other "waters of the U.S." DOE must determine if the proposed action has the potential for such discharges to any wetlands or other jurisdictional waters. A Section 404 permit requires a CWA Section 401 Water Quality Certification from the DOH Clean Water Branch.

CWA Section 402 sets forth regulations that prohibit the discharge of pollutants into waters of the U.S. from any point source without obtaining a National Pollutant Discharge Elimination System (NPDES) permit. Since the total area of land disturbance during construction activities would be over 1 acre, an NPDES General Permit for Storm Water Activities Associated with Construction Activities pursuant to HAR Chapter 11-55 Appendix C would be required for storm water associated with the construction activities. The NPDES Permit would be obtained prior to the commencement of construction activities. In addition, an NPDES General Permit for Authorizing Discharge of Storm Water Associated with Industrial Activities pursuant to HAR Chapter 11-55 Appendix B may be required.

### 1.8.3 National Historic Preservation Act Section 106 Compliance

The NHPA requires federal agencies to consider the preservation of historic and prehistoric resources. Under the NHPA, the Secretary of the Interior is authorized to expand and maintain a National Register of Historic Places (NRHP). Section 106 of the NHPA mandates that all federal agencies take into account the effects of their undertakings (actions) on historic/prehistoric resources and afford the Advisory Council on Historic Preservation a reasonable opportunity to review and comment on any action that may affect properties that are listed, or are eligible for listing, in the NRHP. Under Section 101 of the NHPA, a State Historic Preservation Office was established in each state and a State Historic Preservation Officer was given the responsibility of reviewing and commenting on any action affecting NRHP properties, or properties eligible for listing in the NRHP.

### 1.8.4 Clean Air Act General Conformity Rule

The U.S. Environmental Protection Agency (EPA) published "Determining Conformity of General Federal Actions to State or Federal Implementation Plans; Final Rule," in the 30 November 1993 Federal Register (40 CFR §§ 6, 51, and 93) regarding Conformity

Determination requirements under Section 176(c) of the Clean Air Act. Federal regulations state that no department, agency, or instrumentality of the federal government shall engage in, support in any way, provide financial assistance for, license to permit, or approve any activity that does not conform to an applicable implementation plan. It is the responsibility of the federal agency to determine, before federal action is taken, whether the action conforms to the applicable implementation plan (40 CFR § 51.850(a)).

### 1.8.5 Coastal Consistency Determination

The federal Coastal Zone Management Act (16 U.S.C. §§ 1451–1456), as amended, requires that federal actions that affect any land or water use or natural resources of a state's coastal zone be consistent, to the maximum extent practicable, with the enforceable policies of a federally approved state coastal zone management plan.

### 1.8.6 Marine Mammal Protection Act

The federal Marine Mammal Protection Act (16 U.S.C. §§ 1361–1407), as amended, established a federal responsibility to conserve marine mammals. Informal consultation will be undertaken with the NOAA Fisheries regarding the potential for impacts to cetaceans and pinnipeds with formal consultations taking place only if potential adverse impacts to marine mammals are foreseeable.

### 1.8.7 Federal, State, and County Reviews and Coordination

Because of the overlapping agency jurisdictions and responsibilities, the wind program for the State of Hawai'i will involve federal, state, and county reviews, approvals, and permits. Future specific projects may require this full range of coordination as well. DBEDT plans to ensure a comprehensive environmental impact review for the wind program, including those requirements unique to Hawai'i law such as the requirement under HEPA for preparation of a CIA. The HIREP Wind EIS will also outline the range of permits that may be required for future projects and how best to phase them to facilitate regulatory compliance.

# CHAPTER 2.0
# PROPOSED ACTION AND ALTERNATIVES BEING CONSIDERED

## 2.1 PROPOSED ACTION AND ALTERNATIVE

The proposed action being considered includes development of a comprehensive program to address environmental issues associated with wind energy development. There is one alternative to the proposed action (and the scenarios described therein) being analyzed at this time in the HIREP Wind EIS: the no-action alternative, as described below. During the public scoping period and analysis, other alternatives may be identified.

### 2.1.1 Programmatic Evaluation and HIREP Wind EIS

The proposed action is for a programmatic coordinated overview of potential environmental effects associated with wind energy development on Maui County islands and associated transmission to the Island of Oʻahu. This action would implement the HIREP Wind in support of the objectives of the HCEI.

The proposed action would provide for the implementation of an oversight program to develop up to 400 MW of wind energy on the Maui County islands of Maui, Lānaʻi, and/or Molokaʻi and transmission of that energy to Oʻahu. A range of wind development projects could be pursued under the proposed action, and include varying power capacities and configurations amongst the islands, undersea cable corridors and routes, and locational criteria for landing sites. The HIREP Wind EIS will address scenarios under the proposed action that consider a programmatic approach to all wind energy deriving from a single island in Maui County, i.e., Lānaʻi, Molokaʻi, or Maui, and all wind energy deriving from a combination of generation on two or more of the islands in Maui County, along with associated programmatic approaches to cable corridors and routes and landing site locations.

As part of the HIREP Wind EIS evaluation, the wind energy development program would establish policies and BMPs to address the administration of wind energy development activities and would identify minimum requirements for mitigation measures. These programmatic policies and BMPs would be applicable to future wind energy development projects on areas covered by this HIREP Wind EIS; other areas would require additional environmental review. Site-specific concerns and the

development of additional mitigation measures would be addressed in project-level reviews, including NEPA and HRS 343 analyses, as required. This approach will also permit consideration of cultural landscapes over a broader range of areas rather than focusing on specific areas. The intent of DBEDT to prepare this HIREP Wind EIS is to be proactive to ensure any follow-on project-specific proposed wind projects follow the guidelines specified in this HIREP Wind EIS in a joint effort with DOE. Subsequent individual development projects that may be proposed to implement some portion or all of the wind energy capacity encompassed by the HIREP Wind EIS would need to take into consideration local wind resource availability, land availability and ownership, slope, and a range of other tiered environmental review considerations, such as specific potential effects to natural and cultural resources and permit requirements, and cultural and historical considerations, among others.

### 2.1.2 No-Action Alternative

Under the no-action alternative, DBEDT would continue administering wind energy development authorizations and approvals in accordance within existing federal, state, and local statutes and requirements. A coordinated overview of potential environmental effects associated with wind energy development would not be developed. Analysis and review of wind energy development applications, including NEPA analyses, HRS 343 analyses, and development of required mitigation measures, would be conducted on a project-by-project basis. As required, individual land use plan amendments, right-of-way grant applications, and other approvals would occur on a project-by-project application basis without the benefit of the overarching, comprehensive analysis provided as envisioned by the HIREP Wind EIS. Under the no-action alternative, it is less likely that the same level of comprehensive and consistent planning, consultation, and mitigation measures would be implemented on a project-specific basis. Follow-on proposed project-specific wind projects would not necessarily be implemented in a consistent manner, potentially making achievement of renewable energy goals addressed by an interisland wind energy program less efficient or feasible.

## 2.2 TECHNOLOGY OVERVIEW

The technology associated with implementing a commercial-scale wind energy generation project may include the following major components and considerations:

- Land-Based Wind Energy Infrastructure
- Undersea Cable Infrastructure

- Electrical Grid Enhancements
- Description of the Maximum Wind Development Analyzed
- Locational Criteria for Wind Infrastructure Development
- Typical Land Areas Needed

### 2.2.1 Overview of Land-Based Wind Energy Infrastructure

The wind farm site could include the following facilities: access roads and turbine pads, construction staging and equipment laydown area, a temporary concrete batch plant, wind turbine generators, an underground electrical collection system, a collector substation or other aggregation system, operations and maintenance (O&M) buildings, and permanent meteorological towers.

To meet the level of commercial wind-generated power envisioned in the HCEI program and achieve a total of up to 400 MW of power available to be transmitted to O‘ahu, approximately 100 to 200 wind turbines, each generating 2 to 4 MW of power, would be required to achieve the program goal of up to 400 MW.

The likely 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 generally associated with major generator farms of this scale would be approximately 250 feet in height and 20 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.

The total height of the turbines from highest arc of the rotor blades would be approximately 400 feet above the turbine base. The actual height depends upon the turbine model ultimately chosen for the project.

The foundations for the turbines would consist of large reinforced concrete mats of up to 60 feet in diameter, typically extending 8 to 10 feet below grade. Other infrastructure required with the turbine includes a pad-mounted “step-up” transformer located at the base of each wind turbine tower.

A series of internal access roads would be constructed within the proposed wind farm site to accommodate construction and maintenance activities. These roads would be

used during construction to access the pad areas and maintained during operation to allow service and access to the turbines and equipment. In areas where roads are rudimentary or do not exist, new roads would be cut or existing roads widened and improved to allow construction access for large materiel and equipment.

Underground cable would run from small step up transformers located at the base of each wind turbine back to the site substation(s) or collector station. These cables would generally run parallel to the turbine access roads and would be buried below the surface.

Construction staging and equipment laydown areas will be used during construction for temporary storage of plant equipment, construction materials, construction equipment, vehicle parking and refueling, water storage, waste disposal and collection receptacles, sanitary facilities, and temporary modular office space. Grading and site improvements may be needed, depending on site uses and characteristics. Size of the laydown area will depend on the range and number of activities being supported. These areas would generally be within the overall area being developed for the wind farm. The developer may decide to use larger common staging areas or decentralize the storage and stage materials at each turbine site, or a combination of both.

The proposed project would require concrete for construction of foundations for the wind turbines, met towers, collector substation, the O&M building, and other equipment pads. Depending upon local availability and weather conditions, concrete typically needs to be poured within 90 minutes of being mixed with water. To accommodate this time constraint, it is anticipated that a temporary concrete batch plant would be constructed within the wind farm site to supply this material.

On the project islands of Maui County, most of the local harbors are small and not designed for large-scale construction traffic. As a result, the harbors are currently restricted to receiving limited loads and may not be used for turbine component off-loading or servicing of larger construction vessels. Improvements to the facilities would be required to implement construction of a commercial-scale wind energy project. Facility improvements would be required for improved access, receiving and distributing large-scale construction materials and equipment, and berthing and servicing of construction vessels.

### 2.2.2 Overview of Undersea Cable Infrastructure

Infrastructure associated with the undersea cable component of the program would include converter stations, connection boxes, beach crossings, and the power cable between the islands.

For efficiency of transmitting power over long distances, electricity produced from the wind farm could be aggregated on the generator island and transported via a submarine cable to the island of O‘ahu. Wind farm power could be consolidated from each turbine and delivered to a converter station, where the alternating current (AC) power from the turbines would be converted to high voltage direct current (HVDC) power for transmission. HVDC power transmission may be used between the converter stations at the generating and receiving islands for efficiency of power transfer. Another converter station would be required on O‘ahu (or the receiving island) to convert the power back to AC for delivery to the HECO substation.

From the converter station, the power cable would go in a buried conduit to a near-beach junction box, then on across the landing area using surface excavation or a buried conduit to cross the beach and enter the ocean floor. In soft bottom areas the cable may be buried for protection against anchor and net snags; in hard bottom areas the cable will be laid directly on the ocean floor.

Landings are required at both ends of the submarine cable. The landing point on the island of O‘ahu would most likely lie between Pearl Harbor and Kane‘ohe Bay, based on locations of existing HECO power infrastructure and HECO criteria for receiving wind power from other islands and integrating it into the consumer grid. The cable could come ashore using trenches or through a horizontal directional drilled tunnel. Bathymetry data would be used in each case to avoid submarine hazards and steep slopes. Should steep slopes be unavoidable, the cable path would cross at an area of perpendicular contours to minimize risk to the cable. In addition to submarine topology, oceanic hazards as defined in the latest NOAA Fisheries charts would also taken into consideration. These include military zones, buoys and fish aggregation devices, dumping grounds, dredge spoil areas, marine conservation areas and the 3-nautical mile state jurisdictional boundary.

Finally, the location of existing submarine cables plays a factor in designing the cable route. Engineers would use both the NOAA Fisheries 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 would be

submitted to U.S. Department of Defense (DoD) offices for review. If needed, the cable route would be adjusted as necessary to address any DoD concerns.

### 2.2.3 Overview of Electrical Grid Enhancements

Depending on the magnitude of the wind energy to be integrated into the existing electrical grid on Oʻahu, and the location of integration into the grid network, the grid enhancements required after leaving the converter station on the receiving island range from "no improvements to the grid structure are required" to "the grid will require substantial changes.'" These improvements may include any or all of the following, although the more complex and extensive enhancements will generally require that all of these be implemented:

- Receiving substation expansion/upgrades/improvements;
- New/upgraded equipment to match the availability and demands of wind energy, available electricity, and consumer demands;
- New power line upgrades or new power lines strung on existing structures along existing corridors;
- New power line corridors and structures; and
- Expanded, upgraded, or new delivery infrastructure in the service area.

### 2.2.4 Description of the Maximum Wind Development Analyzed

#### Wind Energy as the Most Viable Near-Term Technology to Meet HCEI Goals

Subsequent to the signing of the HCEI and the passing of HRS § 269, the cooperative partnership of the NREL, HECO, DOE, and the State of Hawaiʻi, invested large amounts of time and effort to investigate solutions for meeting the HCEI's goals.

The transition to a substantial portfolio of alternative energy sources to replace and supplement current electricity generation capacity required a significant initial program to push the transformation forward, anticipating that implementation of the other projects and technologies would follow. Oʻahu is the most densely populated island in Hawaiʻi, with 80 percent of the population, the bulk of the demand for electricity is on that island. However, due to the limited amount of land and limited viable renewable energy resources on Oʻahu, it is not possible to meet the HCEI's goals without the benefit of

power generation on other islands and interisland transmission connections to get that power to Oʻahu. In 2008, a study by DOE (HCEI 2008) for the State attempted to evaluate the status and applicability of known alternative energy sources for Oʻahu and prioritize recommended projects to achieve the HCEI utilization goals. A range of alternative energy resource use scenarios were considered or were already in development for Oʻahu, including efficiency improvements, ocean/wave energy, generation using municipal solid waste, utility-scale solar projects, rooftop solar, wind projects on Oʻahu, and generation using biomass. Wind power from off-island was recognized as a potential source of significant power, but the challenge of transmitting the power to Oʻahu was also recognized.

The DOE analysis evaluated in detail different scenarios with varying mixes of implementation for renewable energy sources such as rooftop and utility-scale solar, biomass conversion, geothermal, wind, and hydropower, considering the resources of each type that were available on each of the islands. Each scenario detailed the potential contribution of a mix of technologies; incorporating the cost of electricity (cost per megawatt hour) resulting from implementation and an estimate of capital expenditures required (cost per megawatt) to achieve the market penetration identified for that renewable energy source scenario.

In developing the scenarios, the greatest return on investment for the power generation was achieved by maximizing the power that could be generated for each unit of investment, and the savings to the islands were developed in terms of oil exports avoided and long-term reductions in the cost of generated electricity. The most favorable scenarios were those that achieved the greatest long-term savings and generated the most electricity for an efficient capital investment.

Capital costs per megawatt for wind energy were estimated to be 1/3 to 1/2 the costs of rooftop or utility-scale solar installations, and were also less expensive than most of the other technologies evaluated. In addition, resource availability and limitations made the potential contributions of technologies such as biomass conversion, small hydro, and biofuels less feasible for substantially meeting the identified demands and achieving the program's goals. The combined criteria of feasibility, scalability, and cost limited the potential for contributions of several of these options. To reach the HCEI goals of 70 percent alternative sources by 2030, it was necessary to preferentially push forward the most feasible, commercially scalable, economic technology available. Other power types (and local wind power projects) would also contribute to the mix of power generation options for meeting the HCEI goals.

The DOE analysis concluded that, in the near term, electricity generation from wind resources is the most fiscally prudent and technologically feasible form of renewable energy available on a commercial scale, and, in Hawai‘i, that Maui County (the islands of Maui, Lāna‘i, Moloka‘i, and Kaho‘olawe) has the most abundant and viable wind resources on islands located closest to O‘ahu.

### Wind Resources and the Components of a Viable Wind Power System

Hawai‘i has wind resources consistent with utility-scale power production. Good-to-excellent wind resource areas are distributed throughout the islands. The largest contiguous areas are located on the western parts of Moloka‘i and Lāna‘i, on the western and southern shores of Maui, and on the northern and southern tips of Hawai‘i. There are also localized high-wind resource areas on the islands of Kaua‘i and O‘ahu. Solicitation of interest from private developers was sought by HECO in September 2007 for potential projects to address the identified need for wind power generation. A range of proposals were received and evaluated—one of the major potential projects resulting from these evaluations is the HIREP that contemplates building wind farms on two of the islands in Maui County (Lāna‘i and Moloka‘i), to transmit generated power to the island of O‘ahu via an undersea power cable(s), and utility system upgrades on O‘ahu necessary to integrate the variable wind power into O‘ahu’s electrical grid.

The availability of wind energy resources, the State’s commitment to the HCEI, and the stated interest of potential wind power infrastructure developers prompted a more detailed analysis of the economics and benefits of such a development, in the form of the OWITS.

### O‘ahu Wind Integration and Transmission Study

Under the energy agreement signed between the State of Hawai‘i and HECO in October 2008 as part of the HCEI, HECO committed to increasing renewable energy statewide by 1,100 MW (or 40 percent of the total grid demand) by 2030. A major piece of this objective included 400 MW of “Big Wind” added to O‘ahu’s grid from wind power development on Lāna‘i and/or Moloka‘i, transmitted by way of an undersea cable developed with the assistance of the State of Hawai‘i. The Big Wind Agreement defined how the parties could move forward together. Castle & Cooke had previously announced plans to develop a 400-MW wind farm on Lāna‘i. First Wind Hawai‘i, which built and operates the Kaheawa Wind Farm on Maui, had proposed a 300- to 400-MW wind farm on Moloka‘i. The agreement cleared the way for both projects to move ahead to negotiate contracts to sell their energy to HECO on O‘ahu.

Integrating large amounts of variable renewable energy such as wind into an electrical grid is challenging because of the variability of the power output. Previous "wind integration" studies have been performed to examine the technical aspects of integrating large amounts of wind power into the bulk electrical grids in the United States and Europe. The methodologies and lessons learned from these studies were applied to a study of the Oʻahu grid, which is even more challenging because it has a significantly smaller load. The OWITS (NREL 2010), was composed of several smaller studies and was sponsored jointly by HECO, DBEDT, and DOE. The scope of the OWITS work included the following:

- Identify the technical requirements and configuration for an undersea interisland cable to transmit electricity from large wind generators on Molokaʻi and Lānaʻi to Oʻahu.
- Identify the ancillary services and potential mitigation measures to offset the variable availability of planned wind and solar power generation.
- Evaluate potential modifications to the utilities' existing conventional generating units to offset the variable nature of wind and solar energy.
- Change some of the utilities operational practices, and procedures, including an evaluation of the potential benefits of wind forecasting, which is required to operate the island grids with interisland wind integration.

The scenarios studied in the OWITS include 200 MW of wind generation on both Molokaʻi and Lānaʻi, with an additional 100 MW of wind and 100 MW of solar generation on Oʻahu. Small amounts of the Molokaʻi and Lānaʻi wind power were assumed available for local consumption on those islands, but the vast majority would be used for the much larger Oʻahu electrical load. The OWITS scenarios did not include all the solar energy envisioned for Oʻahu under the HCEI, but rather an amount that could be technically integrated into the study methodology within the budget and timeline of the OWITS project. Future integration studies will more specifically address integrating solar energy on Oʻahu and other Hawaiian Islands by building off the results and methodologies of the OWITS.

The conclusion of the OWITS analysis of the Big Wind and undersea cable initiatives under the HCEI agreement is that bringing up to 400 MW of wind to Oʻahu with an undersea cable, although challenging from an engineering and environmental permitting aspect, is technically feasible and should be pursued as an important part of the 40 percent renewable HCEI goal.

### 2.2.5 Locational Criteria for Wind Infrastructure Development

The areas suitable for development of commercial-scale wind energy facilities on the project islands of Maui County represent a generalized location of the "commercially viable" wind generation areas as defined and identified in the NREL 50m Wind Density and 70m Wind Speed Data for Hawai‘i. The proposed wind generation facility would be located within the primary wind resource areas of the islands of Moloka‘i and Lāna‘i, and on the western and southern shores of Maui. A wind farm of up to 400-MW capacity may encompass an area of more than 15,000 acres to allow for terrain, turbine spacing, access, etc. Smaller megawatt sizes would require less area.

In a standard configuration, wind turbines would be separated by approximately 1,000 to 1,500 feet. The final wind turbine locations would be determined based upon site-specific wind measurements, topographical features in the project area, location of sensitive biological and cultural resources, and the type of wind turbine selected (e.g., size).

Landing sites for cable crossing would be determined by cable design and the locations of the wind farm and the receiving island substation(s), with appropriate consideration of existing land uses, impacts to natural and cultural resources, and proximity to wind generation and distribution facilities.

The submarine cable would be buried or laid on the ocean floor along a route approved by relevant 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 to avoid environmentally sensitive areas and minimize the crossing of other marine cables. The submarine cable route would be finalized after the preferred interconnection points (beach crossings) have been determined.

Landing sites on O‘ahu are dependent on existing or new substation sites where the transmitted power can effectively be integrated into the consumer grid. Infrastructures upgrades for the receiving grid would generally be built within existing power facilities, or involve expansion of existing facilities on-site or adjacent to existing structures. However, substantial upgrades to the receiving grid may require that new facilities or power corridors be identified and permitted.

### 2.2.6 Typical Land Areas Needed

As described above, the area within the proposed action that would be encompassed by a proposed wind farm would vary depending on the number of turbines used and the capacity of each turbine. Developed areas for each turbine pad could be 1 to 2 acres in size during construction and equipment laydown and assembly, with approximately 1/2 acre for the final pad and structures. Access roads linking the turbines and other infrastructure would be sized to allow access for construction and maintenance. The converter stations could be up to 10 acres in size, depending on the megawatt size of the wind farm, the design of the converter station, and the overall power load transfer to the receiving island. The submarine power cable would be laid in an approved right-of-way a maximum of 200 feet wide, with the right-of-way stretching between the two islands. All of the land area requirements would be subject to modification and finalization depending on regulatory and permitting requirements, the outcome of the environmental impact analysis, and the final design of the facilities.

# CHAPTER 3.0
# AFFECTED ENVIRONMENTS AND POTENTIAL IMPACTS

This chapter describes the affected environment associated with the proposed action, its encompassed scenarios, and the no-action alternative. The information provided serves as a baseline from which to identify and evaluate potential environmental impacts that could result from implementation of the proposed action or the no-action alternative to determine whether or not preparation of an EIS is warranted. The affected environment describes the natural and man-made environments, which include:

- Geologic and Geographic Resources
- Water Resources
- Terrestrial and Coastal Biological Resources, Species, and Habitat
- Marine/Benthic Biological Resources, Species, and Habitat
- Air Quality
- Noise
- Land Transportation
- Airspace Utilization
- Visual Resources
- Marine Transportation, Recreation, and Commerce
- Public Services, Infrastructure, and Utilities
- Cultural and Historical Resources and Compliance with Act 50
- Socioeconomics
- Public Safety and Health
- Natural Hazards, Hazardous Materials, and Unexploded Ordnance
- Land Use
- Climate and Climate Change

The area of potential effects (APE) under the HIREP Wind EIS will be broadly defined to include potential wind energy generation on the islands of Lānaʻi and Molokaʻi, undersea cable corridors between Maui County and Oʻahu, and utility infrastructure upgrades on the island of Oʻahu. Maui is also included in the analysis as a producer or recipient of wind generated power. Specific locations considered for the various proposed action components on each of these islands are detailed in Chapter 2.0 of the proposed HIREP Wind EISPN (proposed project areas). However, all the specific features of various components of the actual projects are not fully known (e.g., locations of the wind farms, landing sites, undersea cable routes and substations).

## 3.1 GEOLOGIC AND GEOGRAPHIC RESOURCES

### 3.1.1 Definition of Resource

Geology and geography encompass surface features such as soils and topography, as well as subsurface structures, which are formations and materials that comprise the terrestrial contents of the islands as well the seafloor topographic and geological conditions. Geologic resources consist of the earth's surface and subsurface materials. Topography refers to an area's surface features including its shape, height, and depth. Soils are unconsolidated surface materials that form from underlying bedrock or other parent material. Soil drainage, texture, strength, shrink/swell potential, and rates of erosion affect the suitability of the ground to support man-made structures and facilities. In combination with other factors (e.g., climate and terrain), these characteristics are also important considerations in terms of soil productivity and suitability for cultivation.

### 3.1.2 Existing Setting and Conditions

The islands of Lānaʻi, Molokaʻi, Oʻahu, and Maui are part of the Hawaiʻi-Emperor island seamount chain, which consists of a chain of northwest-trending volcanic islands and seamounts. Lānaʻi, Molokaʻi, Oʻahu, and Maui were generated approximately 2 to 3 million years ago by a relatively stationary magma source in the upper mantle known as the Hawaiʻi hot spot. The relief of the islands varies. The once smooth volcanic domes have been weathered and eroded. The older islands of Kauaʻi and Oʻahu are deeply dissected where their surface is one of ridges, valleys, and alluvial fans. The U.S. Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) classifies soils within the United States and prepares maps indicating the soil types present in all states, including Hawaiʻi. The soils in Hawaiʻi primarily derive from the decomposition of two rock types: basalt, which has roughly 10 percent by weight iron (Fe) and coral, which is entirely calcium carbonate. The latter only occurs in very

specific locations (mostly coastal) and is not typically used for agriculture. There also exists soils that are a mixture of the two types, but typically the break-down product of basalt dominates (DLNR 2010).

The listing of specific soil types associated with the islands potentially involved in the proposed action is extensive. The HIREP Wind EIS will discuss the various broad soil categories associated with the potential project areas in each island and discuss their general value, uses, and the various defining characteristics of each. The topography and geology of the seafloor between islands have been investigated and described in numerous documents, including most recently the *Oʻahu Wind Integration and Transmission Study Summary Report* authored by NREL and the *Ocean Floor Survey Extension* completed by the University of Hawaiʻi's School of Ocean and Earth Sciences and Technology (SOEST). These studies outline preferred routes for possible future undersea cables based on a variety of factors including length, distance, sea floor topography, hazards, island landings, and location and potential location of related land-based wind development infrastructure.

**Agricultural Lands of Importance to the State of Hawaiʻi**

Agricultural Lands of Importance to the State of Hawaiʻi (ALISH) is a system that identifies and classifies agriculturally suitable land primarily (though not exclusively) on the basis of soil characteristics. *Important Agricultural Lands* are further subcategorized as "Prime," "Unique," and "Other," agricultural lands. Prime agricultural lands are land best suited for the production of food, feed, forage, and fiber crops (USDA 2000).

**Lānaʻi**

The island of Lānaʻi 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 Lānaʻihale, or Mount Pālāwai. The landscape is punctuated by Kanepuʻu, a massive ridge that rises to an elevation of 1,780 feet above mean sea level. The areas on the west side of the island are further categorized as containing "Semiarid and Subhumid Low Mountain Slopes" and "Very Stony Land and Rock Land" as shown on the State of Hawaiʻi's 'Major Land Resource Area Type" Map. The island of Lānaʻi contains "important agricultural lands" subcategorized as "unique" under the Stateʻs ALISH categorization system. These lands are located in the center of the island extending to the west and generally located on the traditional agricultural plateau southwest of Lānaʻi City. Specific soils types on Lānaʻi are numerous as defined in the NRCS Soil Survey. The HIREP Wind EIS will discuss the various soil categories in the

analysis area and discuss their value, uses, and various defining characteristics of each.

**Molokaʻi**

Molokaʻi is built from two distinct shield volcanoes known as East Molokaʻi and the much smaller West Molokaʻi. East Molokaʻi volcano is today only what remains standing of the southern half of the original mountain. The northern half suffered a catastrophic collapse about 1.5 million years ago and now lies as a debris field scattered northward across the Pacific Ocean bottom, while what remains on the island are the highest sea cliffs (pali) in the world. The south shore of Molokaʻi boasts the longest fringing reef in the United States and its holdings—nearly 25 miles long. Molokaʻi is split into two main geographical areas. The low western half is very dry and the soil is heavily denuded due to grazing by goats and poor land management practices. The eastern half of the island is a high plateau rising up to an elevation of 4,900 feet. The ALISH map identifies “prime” agricultural lands in the center of the island extending between Molokaʻi Ranch property and the town of Kaunakakai. “Other Important Agricultural Lands” extend west to the Molokaʻi Ranch property, north of Kaunakakai town and within smaller valley areas on the east side of the island.

**Maui**

Maui's wide variety of landscapes resulted from a unique combination of geology, topography, and climate. Maui is a type of "volcanic doublet," formed from two shield volcanoes that overlapped one another to form an isthmus between them. The older, western volcano has been eroded considerably and is cut by numerous drainages, forming the peaks of the West Maui Mountains. The larger, younger volcano to the east, Haleʻakalā, rises to more than 10,000 feet above sea level. The eastern flanks of both volcanoes are cut by deeply incised valleys and steep-sided ravines that run downslope to the rocky, windswept shoreline. The valley-like Isthmus of Maui that separates the two volcanic masses was formed by sandy erosional deposits. Maui's last volcanic eruption occurred around 1790. Although considered dormant by volcanologists, Haleʻakalā is certainly capable of further eruptions. ALISH maps define ‘prime’ agricultural lands throughout the isthmus area as well as along the Lahaīna- Kapalua corridor. ‘Other Important Agricultural Lands’ are found around the island within the coastal valleys toward the interior, and on the south side of Haleʻakalā.

### O‘ahu

The island of O‘ahu was formed by two shield volcanoes that are now considered extinct: Wai‘anae Volcano forming the west side of the island, and Ko‘olau Volcano forming the east side. Lava flows from the two volcanoes merged to form the central plain (saddle) of O‘ahu. The eroded remains of these volcanoes form the Wai‘anae and Ko‘olau mountain ranges. Features of both mountain ranges include amphitheater-headed valleys and steep cliffs. Eroded materials from the volcanoes form extensive alluvial and colluvial deposits in the lowlands Shallow soils are developed in deep alluvium derived from erosional sediments and consist of silty clays. Near the coast, erosional sediments may be intermingled with marine sediments in the shallow subsurface (Towill 1993).

## 3.1.3 Potential Impacts

Construction-related impacts to soils and geology are anticipated with implementation of wind developments. Clearing, grading, excavating, and recontouring of soils for access roads, wind turbine pads, cable installation, and convertor/inverter construction may result in the removal of vegetation and exposure of soil, leaving areas vulnerable to erosion. This HIREP Wind EIS will identify various anticipated impacts and proposed BMPs that may be applied to future specific projects. The general BMPs to be developed in this current HIREP Wind EIS would be supplemented by site-specific BMPs, including erosion control measures that would be developed and implemented with future projects. Erosion control measures may include, but are not limited to, the creation of control swales to channel runoff; establishment of sediment traps, sediment basins, or erosion control berms; installation of silt fences; and temporary stabilization of areas graded and barren of vegetation. Upon project completion, permanent erosion control measures would be applied; areas cleared or graded during construction would be stabilized with perennial vegetation or pavement.

Wind development may be limited by topographical factors. Wind farm developers have noted that steep, sloped areas are traditionally not conducive to the placement of wind turbines and the creation of access roads to them. Wind developers will analyze individual parcels for acceptability for development. In addition, relevant county and state agencies will review future developments proposed on ALISH soils and determine what, if any, impacts wind developments may have on them and how these impacts can be mitigated. The HIREP Wind EIS will discuss seafloor topography, geography, and associated bathymetry along various potential undersea cable corridors. The analysis, findings, and recommendations of the aforementioned SOEST and NREL studies will be

referenced and discussed in the HIREP Wind EIS along with cable routing impacts on ocean resources and potential mitigation measures and BMPs.

## 3.2 WATER RESOURCES

### 3.2.1 Definition of Resource

Hydrology is the study of the occurrence, distribution, and movement of water on, in, and above the earth. Water resources in Hawai‘i are categorized into surface and groundwater (including aquifers), watersheds, and floodplains. Groundwater refers to the subsurface hydrologic resources, which often are described in terms of depth to the aquifer or water table, water quality, and surrounding geologic composition. Surface water features include lakes, reservoirs, streams, and wetlands. Hawaiian *ahupua‘a* is a traditional subdivision of land. Related to, and often defined and associated with surface water features and watersheds, these land areas consist most frequently of a slice of an island that goes from the top of the local mountain (volcano) to the shore, often following the boundary of a stream. Ahupua‘a traditionally varied in size depending on the economic means of the location and political divisions of the area. As a key element of traditional Hawaiian life, water, both fresh and ocean, plays a unique and important role in the local cultural context.

### 3.2.2 Existing Setting and Conditions

Groundwater is one of Hawai‘i’s most important natural resources. It is used for drinking water; irrigation; and domestic, commercial, and industrial needs. Groundwater provides about 99 percent of Hawai‘i’s domestic water and about 50 percent of all freshwater used in the state. Water beneath the ground surface occurs in two principal zones: the unsaturated zone and the saturated zone. In the unsaturated zone, the pore spaces in rocks contain both air and water, whereas in the saturated zone, the pore spaces are filled with water. The most extensive and productive aquifers in the Hawaiian Islands are formed by volcanic rocks that erupted during the principal building stage of each volcano. Lava from this stage, called the shield stage, consists of basalts that characteristically form thin flows ranging in thickness from a few feet to a few tens of feet. Volcanic-rock aquifers are found throughout the eight major islands and are locally overlain by sedimentary deposits. Sedimentary deposits of alluvium, coralline limestone, and cemented beach or dune sand that typically are considered to be productive aquifers in most of the conterminous United States are relatively poor aquifers in the Hawaiian Islands. Limestone deposits are highly permeable in many places and usually

yield brackish or saltwater because of good hydraulic connection between the ocean and the limestone and because of low recharge to the limestone (USGS 2000).

### 3.2.3 Potential Impacts

Future construction of wind farm projects and convertor-inverter stations as well as the landings for the undersea cable will most likely require excavation and grading activities. These activities could affect adjacent surface water features or groundwater resources particularly in nearshore waters, estuaries, embayments, and open coastal waters, as classified in the Hawai'i Water Quality Standards. Some of these water bodies are classified as Class A waters, while others are classified as Class AA, meaning that they are to be kept in as pristine a state as possible. Additionally, the water bodies at some future development sites may be listed on the CWA § 303(d) list of impaired waters. The HIREP Wind EIS will evaluate how to address, mitigate, and provide BMPs on future wind developments to ensure they do not increase surface water runoff or alter drainage patterns; result in a point source discharge that exceeds state water quality or discharge requirements, standards, or objectives; cause substantial erosion or downstream sedimentation; and/or substantially affect groundwater supply or quality. Mitigation measures that would be implemented to minimize or avoid impacts to hydrology and water resources would also be presented.

## 3.3 TERRESTRIAL AND COASTAL BIOLOGICAL RESOURCES, SPECIES, AND HABITAT

### 3.3.1 Definition of Resource

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 affected areas 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 the islands 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) of the wind program. The ROI for biological resources for the programmatic evaluation includes the following:

- Onshore areas adjacent to zones where cables may come ashore on the four islands;

- All land areas surrounding the areas where wind farms and associated equipment could be sited, based on the defined wind zones described in Chapter 2; and
- Areas on Oahu where improvements to the distribution system could occur.

Elements of the terrestrial components of the proposed program include:

1. Wind farm and facilities construction
2. Roadbuilding
3. Shoreline crossings and nearshore facilities
4. Distribution system improvements
5. Wind farm operations

Species that are federally listed as threatened or endangered, and areas that have been designated as "critical habitat" for those species, are protected under the ESA (16 U.S.C. §§ 1531–1544) as amended. Species listed as threatened or endangered by the State of Hawai'i are protected in accordance with Hawai'i state law (HRS § 195D-4).

### 3.3.2 Existing Setting and Conditions

Flora and fauna that might be affected by program implementation encompass a range that varies between islands and on each island based on site elevation, terrain, slope, soil type, and historic uses.

**Flora**

Lāna i /Moloka'i

Lāna i and other islands exhibit a "dry tropical forest/tropical low shrublands" ecoregion (National Geographic 2007). Many of these areas are largely eroded and previously disturbed land. A native forest may have once covered most of the islands, but by the early 1900s cattle, sheep, and feral goats had removed much of that original habitat (Hirai 1978). For many years, the islands were predominantly a pineapple plantation used for raising cattle, or other agricultural or domestic uses. The disturbed vegetative

communities are now primarily shrub and/or brushland dominated by invasive or nonnative plant species.

Today the principal forested area on Lāna i 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 Lāna i, especially in the north end, which would comprise the program 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 on Lāna i 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, including 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)

The Nature Conservancy manages the 590-acre Kanepuu Preserve on Lāna i. 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 Hawai‘i and is home to 49 plant species found only here, including three species that are federally endangered: sandalwood (iliahi), Hawai‘i gardenia (nau), and *Bonamia menziesii*. This preserve is located about 6 miles northwest of Lāna i City, on the island’s western plateau (TNC 2007).

Similar types of vegetation are expected on areas that may be affected by the wind energy program on Moloka‘i.

Maui

Areas of Maui also exhibit scattered remnants of the native dryland forest and shrublands that historically occupied the area. The remaining pockets of native flora appear to be preserved as a result of the complex geology and the presence of the relatively young volcanic substrate, away from human development. Dominant species include natal redtop (*Melinus repens*), glycine (*Neonotonia wightii*) and koa haole (*Leucaena leucocephala*). The most significant botanical resources include groves of wiliwili (*Erythrina sandwicensis*) and scattered native trees such as hao (*Rauvolfia sandwicensis*) and naio (*Myoporum sandwicense*), the latter of which is of larger size.

Dominant species also include lantana (*Lantana camara*), ‘äkia (*Wikstroemia oahuensis*), and buffel grass (*Cenchrus ciliaris*). At approximately 2,800 feet above sea level (ASL), the scrub habitat transitions to dryland forest, marked by an increased abundance of native plants, including ‘äkia, ‘ohi‘a (*Metrosideros polymorpha*), and ‘ülei (*Osteomeles anthyllidifolia*). Also found on parts of Maui are uncommon native species such as hala pepe (*Pleomele auwahiensis*), olopua (*Nestegis sandwicensis*), kauila (*Alphitonia ponderosa*), and ‘aiea (*Nothocestrum latifolium*). In addition, native dryland scrub species include ‘a‘ali‘i (*Dodonea viscosa*), pukiawe (*Styphelia tameiameiae*), and ‘äla‘a (*Pouteria sandwicensis*).

O‘ahu

O‘ahu, having experienced the most development pressure of the islands, displays only scattered remnants of its intact wet native forest. Native plant species known to O‘ahu include those listed in Table 3-1.

**Table 3-1**
**Native Plant Species**

| Common Local Name | Scientific Name |
|---|---|
| ‘a‘ali’i | *Dodonaea viscosa* |
| ‘akia | *Wikstroemia O‘ahuensis* |
| ‘ie‘ie | *Freycinetia arbore* |
| ‘ihi | *Oxalis corniculata* |
| ‘iliahi | *Santalum freycinetianum* var. *freycinetianum* |
| ‘öhi‘a | *Metrosideros polymorpha* var. *polymorpha* |
| ‘uhaloa | *Waltheria indica* |

| Common Local Name | Scientific Name |
|---|---|
| ʻäkolea | *Athyrium microphyllum* |
| ʻalaʻala wai nui | *Peperomia macraeana* |
| alaheʻe | *Psydrax odorata* |
| ʻamaʻu | *Sadleria cyatheoides* |
| ʻamaʻu | *Sadleria pallida* |
| glaberrima | 'öhi'a |
| halapepe | *Pleomele halapepe* |
| hapuʻu | *Cibotium chamissoi* |
| häpuʻu 'iʻi | *Cibotium menziesii* |
| häpuʻu pulu | *Cibotium glaucum* |
| hoi kuahiwi | *Smilax melastomifolia* |
| huehue | *Cocculus orbiculatus* |
| kämakahala | *Labordia waiolani* |
| käpana | *Phyllostegia grandiflora* |
| kaunaʻoa pehu | *Cassytha filiformis* |
| ki | *Cordyline fruticosa* |
| kilau | (*Pteridium aquilinum* var. *decompositum*) |
| kö | *Saccharum officinarum* |
| koa | *Acacia koa* |
| kopiko | *Psychotria mariniana* |
| kükae moa | *Melicope clusiifolia* |
| kukui | *Aleurites moluccana* |
| lama | *Diospyros sandwicensis* |
| lehua ʻähihi | *Metrosideros tremuloides* |
| manono | *Kadua affinis* |
| ōhiʻa lehua | *Metrosideros polymorpha* |
| moa | *Psilotum nudum* |
| nanea | *Vigna marina* |
| naupaka kuahiwi | *Scaevola gaudichaudiana* |
| naupaka kuahiwi | *Scaevola mollis* |
| niʻaniʻau | *Nephrolepis exaltata* |
| niu | *Cocos nucifera* |
| no common name | *Carex meyenii* |
| no common name | *Carex wahuensis* |
| no common name | *Cyperus polystachyos* |
| noni | *Morinda citrifolia* |
| ʻöhelo | *Vaccinium calycinum* |
| ʻöhiʻa | *Metrosideros polymorpha* var. |
| olomea | *Perottetia sandwicensis* |
| olopua | *Nestegis sandwicensis* |
| paʻihi | *Rorippa sarmentosa* |
| pai | *Adenophorus hymenophylloides* |
| pakahakaha | *Lepisorus thunbergianus* |
| palaʻā | *Sphenomeris chinensis* |
| palai hinahina | *Hymenophyllum lanceolatum* |
| pilo | *Coprosma longifolia* |
| püʻahanui | *Broussaisia arguta* |
| pukiawe | *Leptecophylla tameiameiae* |
| uluhe | *Dicranopteris linearis* |
| uluhe lau nui | *Diplopterigium pinnatum* |

## Fauna

Much of the fauna observed on the islands are not native to Hawai‘i. Five state species of concern have been noted in areas potentially affected by the program, including the short-eared owl (*Asio flammeus sandwichensis)*, Pacific golden plover (*Pluvialis fulva)*, white-tailed tropicbird *(Phaethon lepturus)*, ruddy turnstone *(Arenaria interpres)*, and great frigatebird *(Fregata minor)*. The Pacific oceanic migratory route is used by the Pacific golden plover *Pluvialis fulva*, bristle-thighed curlew *(Numenius tahitiensis)*, ruddy turnstone *(Arenaria interpres)*, wandering tattler (*Heteroscelus incanus)*, 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 Lāna i include the wedge-tailed shearwater, Hawaiian coot, and Hawaiian duck although habitat may be limited or does not occur (Hirai 1978; USFWS 2007). Only two endemic forest bird species occur on Lāna i today: the amakihi, which is unlikely to be found, and the apapane, which may occur in small numbers at Puu Nene and Maunalei-Hauolaa (Hirai 1978; USFWS 2007). Birds commonly found on the islands include those listed in Table 3-2.

**Table 3-2**
**Common Birds**

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

| Common Local Name | Scientific Name |
|---|---|
| African silverbill | *Lonchura cantans* |
| barn owl | *Tyto alba* |
| black francolin | *Francolinus francolinus* |
| California quail | *Callipepla californica* |
| cattle egret | *Bubulcus ibis* |
| chukar | *Alectoris chukar* |
| common myna | *Acridotheres tristis* |
| common peafowl | *Pavo cristatus* |
| gray francolin | *Francolinus pondicerianus* |
| house finch | *Carpodacus mexicanus* |
| Japanese bush-warbler | *Cettia diphone* |
| Japanese quail | *Coturnix japonica* |
| Japanese white-eye | *Zosterops japonica* |
| Java sparrow | *Padda oryzivora* |
| mourning dove | *Zenaida macroura* |
| northern cardinal | *Cardinalis cardinalis* |
| northern mockingbird | *Mimus polyglottos* |
| nutmeg mannikin | *Lonchura punctulata* |
| red junglefowl | *Gallus gallus* |
| red-crested cardinal | *Paroaria coronate* |
| ring-necked pheasant | *Phasianus colchicus* |
| short-eared owl | *Asio flammeus sandwichensis* |
| sky lark | *Alauda arvensis* |
| spotted dove | *Streptopelia chinensis* |
| zebra dove | *Geopelia striata* |

### Threatened and Endangered Species

Endangered mollusks are known to be present in native forests at elevations above 1,312 feet ASL on Oahu. If expansions to the electrical distribution system require new transmission corridors in previously undeveloped higher altitudes, these species could be affected.

The Hawaiian hoary bat (*Lasiurus cinereus semotus*). The Hawaiian hoary bat is listed as endangered by state and federal wildlife agencies and is protected under state and federal laws. The native pueo (*Asio flammeus sanwichensis*) can inhabit habitat similar to that found on suitable wind energy areas on Lānaʻi and other islands. The pueo is listed as an endangered species on the island of Oʻahu by the State of Hawaiʻi but is not a federally listed species.

The USFWS and Division of Forestry and Wildlife (DOFAW) are the agencies responsible for protecting critical habitat as well as threatened and endangered terrestrial plants and wildlife in Hawaiʻi. Table 3-3 provides a listing of threatened and endangered terrestrial plant wildlife species in the state. During the recent Lānaʻi 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 Lāna i at Lāna'ihale. Newell's shearwaters and Hawaiian hoary bats are not known to breed on the island but occasional sightings have been recorded. Hawaiian stilts breed at the Lāna i wastewater treatment plant located within Lāna i City but are not expected to inhabit or regularly fly over the project area. Development of the Habitat Conservation Plan for the wind farm will evaluate potential incidental impacts to these species and any others species identified during this process.

**Table 3-3**
**Threatened and Endangered Terrestrial Plants and Wildlife**

| Common Local Name | Scientific Name |
|---|---|
| Awalua Ridge tetramolopium (Pamakani) | *Tetramolopium remyi* |
| Great frigatebird (Iwa) | *Frigata minor* |
| Hawaiian coot (Alae keokeo) | *Fulica alai* |
| Hawaiian duck (Koloa-maoli) | *Anas wyvilliana* |
| Hawaiian hoary bat (opeapea) | *Lasiurus cinereus semotus* |
| Hawaiian monk seal | *Monachus schauinslandi* |
| Hawaiian petrel (Uau) | *Pterodroma sandwichensis* |
| Hawaiian short-eared owl (Pueo) | *Asio flammeus sandwichensis* |
| Hawaiian stilt (Aeo) | *Himantopus mexicanus knudseni* |
| Hawksbill sea turtle | *Eretmochelys imbricata* |
| Hidden-petaled abutilon | *Abutilon eremitopetalum* |
| Humpback whale | *Megaptera novaeangliae* |
| Lanai tree snail | (*Partulina semicarinata*) |
| Lanai tree snail | (*Partulina variabilis*) |
| native yellow hibiscus (Mao hau hele) | *Hibiscus brackenridgei* ssp.*brackenridgei* |
| Newell's shearwater (Ao) | *Puffinus auricular's newelli* |
| orange-black damselfly | *Megalagrion xanthomelas* |
| (Ou) | *Psittirostra psittacea* |
| Pacific golden plover (Kolea) | *Pluvialis fulva* |
| Pacific green sea turtle | *Chelonia mydas* |
| ruddy turnstone (Akekeke) | *Arenaria interpres* |
| white-tailed tropicbird (Koae kea) | *Phaethon lepturus* |

Threatened, endangered, and/or sensitive wildlife species occur in the program area, 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 Lāna i was historically abundant (Hirai 1978), even though the native forest of Lāna i 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 Lāna i are not known, but most likely include a combination of mosquito-borne avian

disease; the destruction of the native mountain forest habitat; and invasive species such as goats, deer, feral cats, and rats.

There is the potential 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 Lānaʻihale 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). DOFAW has heard Newell's shearwater calls on occasion during nighttime surveys at the Hawaiian petrel colony on Lāna i 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 Lāna i.

The Hawaiian stilt and Hawaiian hoary bat are two other endangered species that have been documented on Lāna i. Although Hawaiian stilts are known to occur in Lāna i City at the wastewater treatment plant, they are believed to have an overall low potential for occurrence in the program 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 Lāna i, their breeding status is not known.

Critical habitat exists for 37 plant species on Lāna i (USFWS 2000), and zones of designated critical habitat occur in the program area. Critical habitat for several endangered vegetation species occurs within the proposed program area. Many listed plant species that have occurred historically on Lāna i may no longer be present, though some listed species have been documented in suitable areas for wind energy development. These areas of overlap would need to be surveyed during the appropriate season between November and May for a current status update and evaluation within the program area and to confirm the potential for effect. The native ohia-lehua (*Metrosideros polymorpha*) and false staghorn fern, or uluhe (*Dicranopteris linearis*), are found only above elevations of 2,000 feet.

Similar faunal characteristics are anticipated on Molokaʻi. On Oahu, only the hoary bat is considered a likely candidate to be encountered during program-related activities.

### 3.3.3 Potential Impacts

Potential impacts to terrestrial biological resources as a result of program implementation are addressed in the following structure:

- Wind Farm
    - Wind farm and facilities construction – potential effects include habitat loss, displacement of populations, and restriction of movement corridors
    - Roadbuilding – potential effects include habitat loss, displacement of populations, and restriction of movement corridors
    - Shoreline crossings and near-shore facilities – potential effects include habitat loss, displacement of populations, and restriction of movement corridors. Sensitive and unique species are more likely to be encountered. Regulatory restrictions on siting, design, and implementation are greater.
    - Wind farm operations – effects on local and migratory bird populations. Noise and visual effects to birds and other fauna. Shading and light flicker may affect plant communities.
- Grid Enhancements
    - Expansion and improvements within existing footprints – generally occur in previously disturbed areas and are less likely to affect flora and fauna
    - New power corridors and structure footprints – more potential for effects to wildlife and flora, especially if entering previously undisturbed or sensitive areas
    - Habitat loss within new corridors and associated construction areas – design and construction activities would be constrained if impacting unique or sensitive habitats.
- Electric and Magnetic Fields and Electromagnetic Interference

The Hawaiian petrel and the Hawaiian hoary bat are known to utilize the program 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. Consultation with resource agencies would be required to determine potential effects and lay out appropriate design and operation BMPs. During the tiered project-specific EA/EIS phase, field studies will be conducted to determine the presence of sensitive species within or near proposed wind energy facilities.

Depending on the description and location of the tiered site-specific projects considered in the next phase of the program, future studies and evaluations could include:

- Assessment of Avian Use and Habitat Composition at Proposed Transmission Line Corridors and Grid Tie Sites
- Avian Radar Surveys at the New Transmission Line Corridors and Risk of Collision Model
    - The construction of support facilities, access roads, and transmission lines may affect local wildlife by disturbing normal behavioral activities such as foraging, mating, and nesting. While these factors may result from the construction activities, the key component of the impact assessment for this project will be the estimation of the annual bird mortality rate on the Newell's shearwater, the Hawaiian petrel, and the Nēnē resulting directly from transmission line collisions.
- Avian Wetland Surveys at New Transmission Line Corridors
    - Water birds, migratory shorebirds, and migratory waterfowl would be most affected from the removal of any nesting habitat and disturbance from construction activities during the breeding or migrating seasons.
- Hawaiian Hoary Bat Study Protocol at the Wind Energy Sites
    - The mainland hoary bat (*Lasiurus cinereus*) is among the group of species (migratory, tree-roosting bats) most commonly killed by wind turbines.
- Avian Radar Surveys at the Wind Energy Sites and Risk of Collision Model

The operation of the overhead portion, and to a lesser extent at the AC/DC converter station, produces an electrical phenomenon known as a "corona." A corona results from the air in the immediate vicinity of the energized conductors being stressed by the high voltage impressed on them. The effects of the corona can be seen in the production of audible and radio noise and ions (negative and positively charged air molecules).

## 3.4 MARINE/BENTHIC BIOLOGICAL RESOURCES, SPECIES, AND HABITAT

### 3.4.1 Definition of Resource

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 affected areas from surrounding habitat areas. These wildlife species may include birds and terrestrial mammals, and marine

wildlife (mammals, sea turtles, fish, and marine invertebrates, including coral) that inhabit the waters surrounding the islands and within the vicinity of the marine cable. These resources will all be evaluated when they occur adjacent to or in the vicinity of the ROI of the wind energy program.

The ROI for biological resources for the programmatic evaluation includes the following:

- All waters within the corridors where underwater power cables could potentially be laid and
- Coastal waters out to 1/4 mile from shore in coastal areas where cables could come ashore.

Species that are federally listed as threatened or endangered, and areas that have been designated as "critical habitat" for those species, are protected under the ESA of 1973 (16 U.S.C. §§ 1531–1544) as amended. Species listed as threatened or endangered by the State of Hawai'i are protected in accordance with Hawai'i state law (HRS § 195D-4).

### 3.4.2 Existing Setting and Conditions

The proposed underwater cable routes encompass approximately 220 miles of seafloor along potentially impacted corridors. It is likely that the seafloor will be disturbed and that sediment plumes will be generated. It is also noted that the majority of the different proposed routes are in designated Marine Protected Areas and as such special care must be taken to ensure that habitats are accurately mapped within these areas. Once the seafloor habitats are defined and data analyzed, potential impacts of the project to the resident fauna can be evaluated. One of the major issues to be addressed will be the location of deepwater corals that are believed to occur in the area. These organisms are long-lived, often more than 100 years, and damage to individual specimens or assemblages are not reparable. The Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE) has recently released guidance on deepwater industrial operations in the Gulf of Mexico, outlining procedures and guidelines for evaluating impacts to sensitive benthic communities and other concerns—such guidelines may soon be developed for alternative energy programs on the outer continental shelf, and may be applicable to BMPs being developed for the HIREP program.

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, nearshore 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) (see Figure 3). 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 NOAA Fisheries.

The cable component of the proposed program would take place in waters protected under the National Marine Sanctuary System. 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 Lāna i, between Lāna i and Maui, and between Lāna i and Moloka‘i, are all part of the HIHWNMS. This habitat has been designated as a protection ground for humpback whales and their breeding habitat. Hawai‘i is the only area in the United States where humpback whales mate, calve, and nurse their young.

**Threatened and Endangered Species**

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 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 Hawai‘i as threatened or endangered (HRS 195D-4);
- Animal species fully protected in Hawai‘i; and

- Animal species of concern to the DOFAW and the Hawai‘i Biodiversity and Mapping Program (formerly the Hawai‘i Natural Heritage Program).

Special-status species are legally protected under Hawai‘i state law and the ESA.

**Coral**

Proposed interisland undersea cables potentially come onshore through coral reef areas. The functions and values of coral reefs must be known to be able to adequately analyze alternatives for the project. Coral reefs are considered “special aquatic sites” (40 CFR 230, Subpart E) and therefore NEPA requires appropriate resource mitigation when a federal action is undertaken in this ecosystem. USACE regulates activities in coral reef ecosystems through the implementation of Section 10 of the Rivers and Harbors Act, Section 404 of the CWA, and Section 103 of the Marine Protection, Research, and Sanctuaries Act.

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 EPA as special aquatic sites (40 CFR 230). Also, the State of Hawai‘i 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 U.S. 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.

**Whales/Marine Mammals**

The four-island area 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 Lāna i or in the surrounding waters. Also, two listed species of sea turtles inhabit waters off Lāna i 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 Hawai‘i (USFWS 2007).

Special emphasis in the deep water evaluation conducted for the program will be on the location and extent of areas where evidence of beaked whale feeding is suggested from distinctive tracks on the seafloor in the whale sanctuary (Dr. Les Watling, UofH, personal communication). This information would be considered for design and construction approaches to laying the undersea power cable.

**Fish/Essential Fish Habitat Assessment**

The 1996 Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) set forth essential fish habitat (EFH) provisions to identify and protect important habitats of federally managed and anadromous fish species. This requires preparation of an EFH assessment. In addition, Hawaiian fisheries resources are managed through the NOAA Fisheries Pacific Islands Regional Office and the Western Pacific Regional Fishery Management Council (WPRFMC). Since the 1980s, the WPRFMC has been managing fisheries through separate species Fishery Management Plans (FMPs) but is beginning to develop an ecosystem-based management of fisheries in the U.S. Pacific Islands and as such is restructuring its management framework from species-based FMPs to place-based Fishery Ecosystem Plans.

Essential fish habitat (EFH) is defined by the 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 U.S.C., § 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.

An EFH assessment will be prepared as outlined in the NOAA document *Preparing Essential Fish Habitat Assessments: A Guide for Federal Action Agencies, Version 1*. The EFH assessment will also include information regarding Habitat Areas of Particular Concern (HAPCs) that may be in the project area. The HAPCs are a subset of the EFH areas that merit special considerations to conserve the habitat. Most species managed by the WPRFMC with EFH within the project area will likely have HAPCs somewhere within the project area as well.

### 3.4.3 Potential Impacts

Program implementation activities that may affect benthic and nearshore marine biological resources, species, and habitat are discussed below. For each program activity, BMPs and preferred approaches will be detailed for developers to incorporate into siting, design, and construction planning. These activities include:

- Improvements to harbors transshipping construction materials for program facilities
- Shore crossing and emergence of cable in the marine environment
- Burial of cable during installation—ship operations, bottom disturbance
- Crossing designated sanctuary areas—presence of listed species, crossing of designated areas—consultation required in a Biological Assessment (BA)
- Potential effects to designated fishing areas, groundfish zones, and other areas identified during scoping activities as environmentally or culturally sensitive
- Physical presence of cable on hard bottom after installation
- Electric and magnetic fields (EMF) of HVDC cables during operation

## Undersea Power Cable

Harbor Improvements

*Fauna*

In general, few effects to fauna during harbor improvements are anticipated. This activity is confined to a limited area where historic shipping/receiving operations have been conducted. Seabirds would generally avoid the construction zone during disturbing activities but in general see the presence of man and his associated activities as a potential food source.

*Threatened and Endangered Species*

No threatened and endangered species are expected to occur in areas where harbor operations are currently conducted or where harbor improvements would be implemented.

*Coral*

Depending on the extent of required improvements, some expansion into coral areas not currently affected is possible. Project design would seek to minimize potential destruction of corals and protect existing reef areas from construction/siltation effects.

*Whales/Marine Mammals*

Coastal harbor improvement activities are localized and limited in area and not likely to affect whales or marine mammals in the region. Marine mammals that frequent harbor areas are acclimated to the types of human activities associated with the required improvements.

*Fish/EFH*

Coastal harbor improvement activities are localized and limited in area and not likely to affect fish or EFH in the region.

## Cable Laying/Shore Crossing

*Flora and Fauna*

Impacts to coral reef and other sensitive coastal resources could occur through disturbance from marine cable installation. Consultation with resource agencies would be required to determine potential effects and lay out appropriate design and operation BMPs. During the tiered project-specific EA/EIS phase, 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.

Impacts to turtles and monk seal activities could occur through disturbance from marine cable installation and shore crossings. Consultation with resource agencies would be required to determine potential effects and lay out appropriate design and operation BMPs. During the tiered project-specific EA/EIS phase, 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 and facility locations.

Placement of power cables on the ocean floor temporarily leads to impacts such as increased turbidity, noise, disturbance, habitat loss, habitat damage, and in certain cases long-term habitat change due to introduction of artificial substrate. However, environmental impacts are generally limited to the near proximity of cable routes (e.g., cable corridor widths of approximately 10 meters) and only in the case of alteration of habitat are they typically long term.

Depending on the description and location of the tiered site-specific projects considered in the next phase of the program, future studies and evaluations could include:

- Seabirds and Marine Mammals at Proposed Cable Landing Sites
- Shore-based Bird and Marine Mammal Surveys and Habitat Exposure

*Endangered, Threatened, and Protected Species in Nearshore Waters and Wetlands*

A Section 7 consultation with USFWS and NOAA Fisheries will be initiated through preparation of a BA. The primary scope will involve a review of the literature and close work with state biologists, the potential construction contractor, and species experts to develop BMPs.

Potential issues in nearshore waters and wetlands include vessel strikes of marine mammals and sea turtles while laying the cable, noise while drilling or laying cable, destruction of foraging resources in nearshore waters and wetlands, disruption of resting and nesting activities on beaches and in wetlands, and potential EMF and thermal radiation impacts during cable operation. Similar issues will occur for deep water areas. A BA will be prepared, which will describe the endangered, threatened, and protected species of the areas studied at the different alternatives locations. This resource report will be necessary when analyzing potential project alternatives.

*Coral*

Impacts to coral reef and other sensitive coastal resources could occur through disturbance from marine cable installation. Consultation with resource agencies would be required to determine potential effects and lay out appropriate design and operation BMPs. During the tiered project-specific EA/EIS phase, 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.

*Whales/Marine Mammals*

Impacts to whales and marine mammals could occur through disturbance from marine cable installation. Consultation with resource agencies would be required to determine potential effects and lay out appropriate design and operation BMPs, including seasonal construction activity restrictions, presence of spotters, etc. During the tiered project-specific EA/EIS phase, a review of existing data on whales and marine mammals will be conducted to identify a preferred route(s) that would minimize impacts to these resources.

*Fish/EFH*

Impacts to fisheries and EFH could occur through disturbance from marine cable installation. Consultation with resource agencies would be required to determine potential effects and lay out appropriate design and operation BMPs. During the tiered project-specific EA/EIS phase, a review of existing data on fisheries and EFH will be conducted to identify a preferred route(s) that would minimize impacts to these resources.

Operation

The cable will traverse different aquatic habits as it crosses interisland channels and then goes onshore, including seagrass, emergent vegetation, macroalgae, coral reef, unconsolidated sediment, pavement, and coralline algae. Several aspects of the project have the potential to affect aquatic ecological functions, including physical disturbance to the bottom, directional drilling to lay cable (including noise impacts), operation of marine vessels to install cable (including potential oil spills), and operational effects of EMF and thermal radiation on aquatic life. Potential issues that must be addressed as they may require federal or state permits include interactions with protected species, loss of protected habitat, reduced functions and values of protected habitat, and decrease in water quality.

*Electric and Magnetic Fields and Electromagnetic Interference*

Following deployment of a power cable, transmission of electric power through the cable may generate EMF strong enough to disturb the behavior and migration of species sensitive to EMF, which can include certain fish and marine mammals. Magnetic fields are generated by the flow of current and increase in strength as current increases; HVDC cables produce stronger electromagnetic fields than AC cables.

As part of the normal operation of the HVDC power cable EMFs are produced. The HIREP Wind EIS will review the cable developer's findings of the magnitude and characteristics of these fields and review their effects on the environment, based on current state of knowledge and established standards.

Cable Laying/Offshore Corridors

*Flora and Fauna*

Most of the endangered and threatened marine species referred to in other parts of this review are applicable to the offshore cable routes. In particular, the humpback whales associated with the marine sanctuaries are of particular concern. To these should be added the monk seals that may feed on the seafloor along the certain areas of the cable corridors. Marine turtles, especially the green and hawksbill turtles that are on the federal threatened and endangered lists, respectively, occur in the offshore areas.

Of concern to the BOEMRE, however, are any sensitive habitats that might be encountered along the offshore deep-water corridors where cable laying might take

place. Sensitive habitats of concern include deepwater coral communities consisting of species that may be in excess of 100 years old. Such organisms, if damaged, will not recover. Because these corals and smaller associated fauna represent a unique assemblage, they must be avoided. BOEMRE has established exclusion zone parameters that must be adhered to in any project where there might be disturbance to the seafloor. It is not only necessary to avoid direct damage to the corals, but it is critical to avoid transport of sediment from the sediment laying activities. Transported sediment may clog or otherwise inhibit the filter feeding activities of these sensitive organisms.

To date, bathymetric surveys by SOEST have been used to define preferred and alternative corridors for the offshore cable routes that connect O ahu, Moloka i, Lāna i, and Maui. The latest report, SOEST (2010) provides a summary of their results. In general the routes avoid critical demersal fish habitat but cannot entirely avoid the humpback whale sanctuaries. The routes do cross areas of hard substrate and other areas of the seafloor where deep-water corals may reside. Seafloor video taken with remotely operated vehicles (ROVs) and towed camera sleds have been used to provide imagery of the seafloor and define benthic habitats. This resource will need to be evaluated prior to final selection of the preferred corridors for the cable laying.

## 3.5 AIR QUALITY

### 3.5.1 Definition of Resource

Air pollution is caused by many different man-made and natural sources. There are industrial sources of pollution, such as power plants and refineries; mobile sources, such as cars, trucks, and buses; agricultural sources, such as cane burning; and natural sources, such as windblown dust and volcanic activity. The DOH Clean Air Branch, monitors the ambient air in Hawai‘i for various gaseous and particulate air pollutants. The EPA has set national ambient air quality standards (NAAQS) for six criteria pollutants: carbon monoxide, nitrogen dioxide, sulfur dioxide, lead, ozone, and particulate matter ($PM_{10}$ and $PM_{2.5}$). Hawai‘i has also established a state ambient air standard for hydrogen sulfide. The primary purpose of the statewide monitoring network is to measure ambient air concentrations of these pollutants and ensure that these air quality standards are met.

### 3.5.2 Existing Setting and Conditions

Air quality in Hawai‘i continues to be one of the best air quality resources in the nation due to the islands’ surface area and traditional trade winds, and criteria pollutant levels

remain well below state and federal ambient air quality standards. The DOH and the EPA maintain a network of air quality monitoring stations throughout the islands. Data collected from these monitoring stations indicate that criteria pollutant levels remain well below state and federal ambient air quality standards. A unique feature affecting Hawai'i's air quality is the continued eruption of the Kīlauea volcano and its airborne emissions, which occasionally result in exceedances of NAAQS for some pollutants. The EPA considers the volcano a natural, uncontrollable event and therefore the state is requesting exclusion of these NAAQS exceedances from attainment/non-attainment determination. Excluding the exceedances because of the volcano, the State of Hawai'i continues to be in attainment of all NAAQS (DOH 2007).

### 3.5.3 Potential Impacts

An air quality impact analysis would not be required as part of this HIREP Wind EIS as no physical development is proposed at this time. However, an air emissions analysis of possible future wind developments, including construction and operational activities, would be included as part of this HIREP Wind EIS. A similar emissions analysis would be utilized to estimate climate change-related GHG emissions from construction and operational activities related to future projects. Cumulatively, air quality may improve with the completion of future wind energy projects and reduction in polluting fossil fuel power sources.

## 3.6 NOISE

### 3.6.1 Definition of Resource

The word 'noise' means any unwanted sound. Noise can block, distort, change or interfere with the meaning of a message in human, animal and electronic communication both on land and underwater. No completely satisfactory way exists to measure the subjective effects of noise, or to measure the corresponding reactions of annoyance and dissatisfaction. This lack of a common standard is primarily because of the wide variation in individual thresholds of annoyance and habituation to noise. An important way of determining a person's subjective reaction to a new noise is by comparing it to the existing or "ambient" environment to which that person has adapted. In general, the more the level or the tonal (frequency) variations of a noise exceed the previously existing ambient noise level or tonal quality, the less acceptable the new noise would be, as judged by the exposed individual. Different sounds have different frequency content. When describing sound and its effect on a human population, A-weighted (dBA) sound levels are typically used to account for the response of the

human ear. The term ”A-weighted“ refers to a filtering of the noise signal to emphasize frequencies in the middle of the audible spectrum and to deemphasize low and high frequencies in a manner corresponding to the way the human ear perceives sound. This filtering network has been established by the American National Standards Institute. The dBA noise level has been found to correlate well with a person’s judgment of the noisiness of different sounds and has been used for many years as a measure of community noise. The State of Hawai‘i regulates noise exposure in the following statutes and rules; HRS 342F *Noise Pollution*, HAR 11-46 *Community Noise Control*, and HAR 12-200.1 *Occupational Noise Exposure*. Per HAR 11-46-4, the maximum daytime permissible sound levels within areas zoned preservation and agricultural are 55 and 70 dBA, respectively. Construction activities may not exceed the maximum permissible sound levels for more than 10 percent of the time within any 20-minute period, except by permit or variance issued.

### 3.6.2 Existing Setting and Conditions

Construction of future proposed projects would require the operation of heavy equipment and construction vehicles for various activities including construction of access roads, excavation, pouring of foundations, installation of buried and aboveground electrical interconnects, and the erection of turbine components. Operation of wind turbines commonly generates some noise as the blades rotate. In general, it can be assumed that dense and urbanized O‘ahu would have more noise than Maui, which in turn is generally louder than both Lāna‘i and Moloka‘i. Noise and its impact are dependent on a variety of factors including location, proximate uses, configuration, and acoustic sensitivity of receptors.

### 3.6.3 Potential Impacts

Currently, there are no local or federal noise control regulations, instituting decibel limits that directly apply to wind development projects. Typical construction equipment and vehicle noise levels will be summarized. Potential sensitive land uses to be affected from both construction and operational noise-generating sources will be identified. Fundamental acoustical principles will be used to predict potential noise impact from a hypothetical future wind development. The HIREP Wind EIS will outline anticipated noise impacts using data from other areas where wind development exists. The HIREP Wind EIS will also outline standard BMPs and conditions that may be applied to future projects to mitigate noise impacts. As with other sections of analysis in this HIREP Wind EIS, the lack of a specific wind development precludes a detailed evaluation of the potential noise impacts associated with construction activities and operation. However,

the HIREP Wind EIS will describe the predicted noise levels associated with construction, standard turbines, cabling, and the associated wind farm facilities, and then will compare those noise levels to applicable noise standards. The HIREP Wind EIS will outline standardized measures that would be implemented to minimize unnecessary noise from wind energy developments both at the terrestrial and underwater level.

## 3.7 LAND TRANSPORTATION

### 3.7.1 Definition of Resources

This chapter discusses the existing land transportation roadway features that support vehicular and pedestrian traffic in the areas under consideration for the proposed wind program. The areas under consideration include the parts of Lānaʻi, Molokaʻi, Maui, and Oʻahu.

Discussions in the Draft HIREP Wind EIS will include potential impacts to the existing transportation features affected by the implementation of the proposed program.

### 3.7.2 Affected Environment

**Lānaʻi**

The sole principal arterial road is Route 440, Kaumālapaʻu Highway, which runs from Kaumālapaʻu Harbor to the intersection with Mānele Road in Lānaʻi City, continuing on Mānele Road to Hulopoʻe Beach Park. There are some secondary roads; most are ungraded dirt roads requiring a four-wheel drive. The areas under consideration for wind generation and associated facilities on the western part of the island are connected by Polihua Road.

**Molokaʻi**

There are several principal arterial roads:

- Route 450, Kamehameha V Highway: from Kaunakakai to Hālawa Valley
- Route 460, Maunaloa Highway: from Maunaloa Village to Kaunakakai
- Route 465: Airport Loop off of Maunaloa Highway;

- Route 470, Kalaʻe Highway: Intersection with Maunaloa Highway to Kalaupapa Lookout;
- Route 480, Puʻupeʻelua Avenue: Intersection with Maunaloa Highway to intersection with Farrington Avenue.

There are secondary roads and, similar to Lānaʻi, unpaved roads are common. Generally speaking, there is road access to the areas under consideration for wind generation and associated facilities are found along the northern half of the island between Maunaloa and Kualapuʻu, and along the southern half of the island east of Kaunakakai.

**Maui**

There are a dozen roads and highways under the jurisdiction of the State of Hawaiʻi.

- Route 30, Honoapiʻilani Highway: Intersection with Kaahumanu Avenue (Route 32) in Wailuku to Keawalua
- Route 31, Piʻilani Highway: Intersection with Mokulele Highway (Route 311) to Wailea
- Route 32, Kaahumanu Avenue: Intersection with Hana Highway (Route 36) near Kahului Harbor to Wailuku
- Route 36, Hana Highway: Kahului Harbor to intersection with Kaupakulua Road
- Route 37, Haleakala Highway: Kahului Airport to intersection with Route 377 in Kula, then continues on as Kula Highway
- Route 310, North Kihei Road: Intersection with Honoapiʻilani Highway (Route 30) to intersection with Mokulele Highway (Route 311) and Piʻilani Highway (Route 31)
- Route 311, Mokulele Highway: Intersection with Kūihelani Highway (Route 380) to intersection with North Kihei Road (Route 310)
- Route 340, Kahekili Highway: Intersection with Waiehu Beach Road to Camp Maluhia
- Route 360, Hana Highway: Continuation of Hana Highway Route 36 at intersection with Kaupakulua Road to Hana

- Route 377, Haleakala Highway: Junction of Kula Highway (Route 37) to junction with Kekaulike Avenue
- Route 378, Haleakala Crater Road: Junction with Kekaulike Avenue to Haleakala National Park
- Route 380, Kuihelani Highway: Intersection with Honoapiʻilani Highway (Route 30) to intersection with Mokulele Highway (Route 311)

There is an extensive network of secondary and unpaved roads to support urban and semirural settlements throughout the island. The areas under consideration for wind generation and associated facilities are accessible by Maui's road network.

**Oʻahu**

The Hawaiʻi Department of Transportation (HDOT) maintains the four Interstate Highways:

- Interstate H-1: From Route 93, Farrington Highway, in Kapolei to Route 72, Kalanianaole Highway in Kāhala
- Interstate H-2, Veterans Memorial Freeway: From Interstate H-1 in Pearl City to Wilikina Drive (Wahiawā Bypass, Route 99) in Wahiawā near Schofield Barracks and Wheeler Army Airfield
- Interstate H-3, John A. Burns Freeway: From the intersection of the Interstate H-1 at Hālawa near Pearl Harbor to the Marine Corps Base Hawaiʻi
- Interstate H-201, Moanalua Freeway: An auxiliary route of the Interstate Highway; 4-mile loop connects exits 13 and 19 on Interstate H-1, and passes Fort Shafter, Tripler Army Medical Center, and Red Hill

The HDOT is also the administrator of the islandʻs 21 state roads and highways.

- Interstate Route H-1: Connection with Kalanianaole Highway in Waialae to connection with Farrington Highway in Makakilo
- Interstate Route H-2: Intersection with Interstate Route H-1 at Waiawa Interchange to Wahiawa

- Interstate Route H-3: Marine Corps Base Hawai‘i to intersection with Interstate Route H-1 at Halawa Interchange
- Route 61: Pali Highway, Honolulu to Kailua
- Route 63: Likelike Highway, Kalihi to intersection with Kamehameha Highway (Route 83) in Kane‘ohe
- Route 64: Sand Island Access Road
- Route 65: Kane‘ohe Bay Drive, intersection with Kamehameha Highway (Route 83) in Kane‘ohe to Kailua
- Route 72: Kalanianaole Highway, intersection with Interstate Route H-1 to Intersection with Pali Highway (Route 61)
- Route 76: Fort Weaver Road, intersection with Interstate Route H-1 to Ewa Beach
- Route H201: Moanalua Freeway, Middle Street to Halawa Interchange
- Route 80: Kamehameha Highway, Wahiawa to intersection with Kamehameha Highway (Route 99)
- Route 83: Kamehameha Highway, intersection with Pali Highway (Route 61) to intersection with Kaneohe Bay Drive (Route 65)
- Route 83: Kahekili Highway, Intersection with Likelike Highway (Route 63) to Kahaluu
- Route 83: Kamehameha Highway, Kahaluu to Haleiwa
- Route 92: Nimitz Highway, Pearl Harbor to Honolulu Harbor
- Route 92: Ala Moana Boulevard, Honolulu Harbor to Waikiki
- Route 93: Farrington Highway, Waiawa Interchange to Makua
- Route 95: Kalaeloa Boulevard, Intersection with Interstate Route H-1, Makakilo Interchange to Barbers Point Harbor
- Route 99: Kamehameha Highway, Schofield Barracks to Waialua
- Route 750: Kunia Road, Intersection with Interstate Route H-1 to Schofield Barracks
- Route 930: Farrington Highway Waialua to Dillingham Airfield

O‘ahu has an extensive network of secondary roads. The areas under consideration for landing sites include coastal areas in the vicinity of the Pearl Harbor and Kāne‘ohe Bay, and/or coastal areas in between and are accessible via the existing roadways. If not, site-specific transportation studies would be required for any follow-on projects.

### 3.7.3 Potential Impacts

The roads and roadway networks that could potentially provide access to all of the areas under consideration for the proposed wind program do not presently exist. There would be a need to improve existing available roads, which are limited, and to construct new roadway segments. These improvements and new construction undertakings would be expected to result in a range of impacts that would need to be addressed in the HIREP Wind EIS.

## 3.8 AIRSPACE UTILIZATION

### 3.8.1 Definition of Resource

Airspace is defined as the zone of flight and maneuvering for airplanes, helicopters, and other flying craft that could occur over the Hawaiian Islands. These flights include those for commercial aviation, commercial transport of goods, tourism, military uses, and other uses. Instrumentation for controlling and monitoring these flights, and for other civilian and military uses, also exists and operates in the project area. The implementation of a wind energy development program will potentially affect existing airspace uses.

### 3.8.2 Existing Setting and Conditions

Military Use Areas, established in numerous areas off all U.S. coastlines, are required by the U.S. Air Force, Navy, Marine Corps, and Special Operations Forces to conduct various testing and training missions. Military activities can be quite varied but normally consist of various air-to-air, air-to-surface, and surface-to-surface naval fleet training, submarine and antisubmarine training, and air force exercises. Similar designated flight corridors and use areas exist for civilian aircraft.

The military has established surface danger zones and restricted areas in many areas adjacent to U.S. coastlines. Danger zones are defined as water areas used for a variety of hazardous operations. The danger zones may be closed to the public on a full-time or intermittent basis. A restricted area is a defined water area for the purpose of prohibiting

or limiting public access. Restricted areas generally provide security for U.S. Government property and/or protection to the public from the risks of damage or injury arising from the Government's use of that area. The regulations pertaining to the identification and use of these areas are found at 33 CFR Part 334.

Units of the DoD and the National Aeronautics and Space Administration make use of surface danger zones and restricted areas within coastal waters and offshore for a variety of training and readiness operations. Military operating areas (OPAREAs) define where the U.S. Navy conducts surface and subsurface training and operations, and for ships completing overhaul or extensive repairs in shipyards located along the coasts. The level of activity varies from unit-level training to full-scale Carrier/Expeditionary Strike Group operations and certification. Aircraft operated by all DoD units train within special use airspace overlying the coast and offshore.

There are also military training routes, military operating areas, restricted airspace, and warning areas designated by the Federal Aviation Administration (FAA). Warning areas are the most relevant to the alternative energy program because they are largely located offshore, extending from 3 nautical miles (3.5 miles; 5.6 kilometers) outward from the coast over international waters and in international airspace. These areas are designated as airspace for military activities, but because they occur over international waters, there are no restrictions on nonmilitary aircraft. The purpose of designating such areas is to warn nonparticipating pilots of the potential danger.

When in use for military exercises, the controlling agency notifies civil, general, and other military aviation organizations through notice-to-airmen and notice-to-mariner advisories, which specify the current and scheduled status of the area and warn other aircraft and water craft. Warning areas and military operating areas are generally used for air-to-air training operations. Aircraft operations conducted in warning areas primarily involve air-to-air combat training, such as air combat maneuvers and air intercepts, and are rarely conducted at altitudes below 1,524 meters (5,000 feet).

There are numerous military and civilian radar systems that provide radar coverage along the U.S. coastline. As part of the National Defense Authorization Act of 2006, the DoD was directed to prepare a study addressing the potential for impact of the construction of wind energy developments (including both onshore and offshore) on radar operations. This study was completed in September 2006 and submitted to Congress. In the report, the DoD found potential for conflict between installation of wind energy developments and the operation of various radar systems; it recommended that additional studies be undertaken to assess the conflict and possible mitigating

measures. The FAA has also issued "potential hazard" letters to proponents of wind energy development pending the review of the potential effect of these developments on radar system performance.

Siting activities would need to be conducted in consultation with aviation regulators in consideration of the FAA-regulated airports on Lānaʻi (Lānaʻi Airport) and Molokaʻi (two, if both are operating—Molokaʻi Airport and Kalaupapa Airport); consideration must also be afforded to existing helipads and other aviation instrumentation. There is also a NEXRAD (radar) on the south-central portion of Molokaʻi.

On Maui, an international airport operates in Kahului, and other small plane airfields are located at Hana Airport and Kapalua Airport.

The DoD would have a concern if they had airfields or low-level military flight routes in the affected areas. There are no military airfields on Maui, Lānaʻi, or Molokaʻi.

### 3.8.3 Potential Impacts

Implementation of wind energy development projects may potentially interfere with designated airspace and use corridors, or restrict the use of existing corridors. Construction of the wind turbines involves the use of tall cranes, and the finished windmill extends more than 400 feet above ground level at the tips of the blades, depending on the size and model of windmill implemented. During operations, a wind farm of 400 MW could employ as many as 200 windmills spread over an area of up to 15,000 acres.

Construction and operation of wind farms would potentially restrict available flight corridors, influence take-off and landing routes and clearances, and influence emergency landing corridors. The FAA generally resists altering flight routes unless they are at higher elevations due to the potential noise and safety impacts and associated controversy if routes are redirected over inhabited areas or sensitive uses.

The FAA would be concerned if an aviation facility (airport, heliport, or instrumentation such as instrument landing systems, radars, etc.) near the construction/operation zone were affected. These airports/heliports have clear zones and obstruction zones that would need to be avoided and the instrumentation facilities also have clear areas to be avoided.

Due to the tall structures located at wind energy projects there may be concerns related to the locations of nearby airports as well as the flight patterns and air space associated with the airports. The FAA requires a notice of proposed construction of a project so that it can determine whether the project would adversely affect commercial, military, or personal air navigation safety. In addition, military training flight corridors and operations are often reviewed separately to determine whether turbines or other structures present a hazard, and or impediment, to military operations. The review of airspace utilization and planning issues for the HIREP Wind EIS would include public and private airfields, airport land use compatibility plans, federal airspace operating restrictions, and military flight training.

Early consultations with local agencies and the DoD would also be needed to review the proposed windfarm locations with any military flight training routes for potential conflicts. In some areas the entire region may be crisscrossed by numerous low and moderate altitude flight training corridors originating to and from the critical DoD facilities. These restricted flight corridors typically start at 400 feet above ground level and extend tens of thousands of feet above ground; however, some start at 200 feet above ground level and some actually extend to ground level. Though some of these flight corridors are on aeronautical charts, others are not, and some are unknown and classified.

The project-specific proponent would review published information regarding military operations requirements and determine the appropriate requirements to be followed by the proposed project, meet with the DoD and determine unpublished military operations requirements (including electromagnetic interference) that would apply to the proposed project, and create/review map(s) and evaluate constraints relative to air space and navigation.

## 3.9 VISUAL RESOURCES

### 3.9.1 Definition of Resource

This section describes the applicable existing visual conditions and resources on the areas under consideration for the proposed wind program on the Islands of Lānaʻi, Molokaʻi, Maui, and Oʻahu. In addition to the areas under consideration, the focus is expanded to the general region of influence.

Visual resources include scenic areas, vistas, or thoroughfares and locations that provide natural-appearing or aesthetically pleasing places or views. This includes natural views such as shorelines, seascapes, cliffs, and man-made views such as

unique buildings, landscaping, parks, and other types of cultural features. Typically, visual resources focus on those that are recognized as highly valued. For instance, there may be specific places, vistas, and scenic overlooks identified by a visitors association. However, visual resources are also recognized as views and vistas that people are accustomed to seeing and often take for granted as a general part of the landscape.

Visual resources are an important part of the quality and sensory experience of an area. Users often encounter an area first and foremost through a visual interaction or their "view" of a place. Views are generally composed of, and often described in terms of foreground, middle-ground, and background depending on the site. For analysis purposes, visual resources are composed of the following:

- Dominant landscape features (e.g., the view of east Molokaʻi from Shipwreck Beach on Lānaʻi
- Diversity (e.g., rows of crops adjacent to an urban area with the mountains as a backdrop)
- Elements of line, color, form, and texture
- Distinctive visual edges (e.g., a housing tract adjacent to a forested area)

### 3.9.2 Affected Environment

#### Lānaʻi

Under a study by NREL, the areas on Lānaʻi that have the most wind energy development potential are on the western side of the island is marked with open space; the area is dry and largely denuded with some vegetation. The topography is gently rolling with abrupt cliff lines reaching down to the shoreline. Key observation points (KOPs) are situated along the state highways and roads, designated viewing areas, and other visitor attractions (e.g., Garden of the Gods). The western side of the island provides an unobstructed view of Molokaʻi and the ocean, while the east and the south sides provide an expansive view of Maui and Kahoʻolawe. Although shoreline areas provide a nearly similar viewing experience, the precipitous cliff line throughout the island, measuring at least 200 feet in height from the shoreline, minimizes the opportunity to view inland features. The ocean and views of Molokaʻi, Maui, and Kahoʻolawe are high-quality visual assets on Lānaʻi that would need to be addressed in any follow-on proposed project-specific wind projects.

**Molokaʻi**

Molokaʻi is built from two shield volcanoes; the west half of the island has relatively even terrain and, despite having prime ALISH designation, the lower part is dry and has sparse vegetation. The eastern half of the island receives greater amounts of precipitation and features lush vegetation on high forests reaching an elevation up to 4,900 feet. Important KOPs are along the state highways and roads, at designated viewing areas, and at visitor attractions. The entire south shore lends unobstructed views of Lānaʻi and Maui; the western side of the island provides views of city lights on Oʻahu at nights. The ocean, views of Lānaʻi and Maui, and the city light views on Oʻahu are high-quality visual assets on Molokaʻi that would need to be addressed in any follow-on proposed project-specific wind projects.

### 3.9.3 Potential Impacts

Probable impacts to the existing visual resources include disruption of the existing scenic views and landscape. The degree of impacts is contingent on the knowledge of the scope and the location of projects. Specific projects filed subsequent to the approval of the proposed wind program should refer to the following guidelines to protect the existing visual resources: *Visual Impact Assessment for Highway Projects*, Federal Highways Administration, Office of Environmental Policy

Additionally, corresponding community plans should be referred to as listed below:

Lānaʻi: *County of Maui 2030 General Plan Countywide Policy Plan*; Lānaʻi Community Plan (1998)

Molokaʻi: *County of Maui 2030 General Plan Countywide Policy Plan*; Molokaʻi Community Plan (2001)

Maui: *County of Maui 2030 General Plan Countywide Policy Plan*; *Draft Maui Island Plan* (2009); *West Maui Community Plan* (1996); *Wailuku-Kahului Community Plan* (2002); *Paʻia-Haʻiku Community Plan* (1995); *Makawao-Pukalani-Kula Community Plan* (1996); and *Kihei-Makena Community Plan* (1998).

Oʻahu: *Oʻahu General Plan; Koʻolaupoko Sustainable Community Plan* (2000); *Primary Urban Center Development Plan* (2004); *Central Oʻahu Sustainable Communities Plan* (2002)

## 3.10 MARINE TRANSPORTATION, RECREATION, AND COMMERCE

### 3.10.1 Definition of Resource

Marine transportation and commerce involves watercraft carrying people (passengers) or goods (cargo). Ship transport can be over any distance by boat, ship, sailboat, or barge, over oceans and lakes, through canals or along rivers. Marine transportation may be for commerce, recreation, or the military (to be provided).

Marine recreation includes both commercial and noncommercial activities involving the ocean and nearshore environment, for enjoyment and/or commerce. In Hawai‘i, the Division of Boating and Ocean Recreation (DOBOR) defines *controlled ocean sports* to include thrill craft, parasailing, water sledding, and high speed boating. Commercial controlled ocean sports must be operated under a Commercial Operating Area Use permit issued by the DOBOR.

### 3.10.2 Existing Setting and Conditions

As a remote island state, Hawai‘i is uniquely dependent on marine transportation, ocean recreation, and commerce for its economic, environmental, and cultural health. Numerous oversight agencies, organizations, and regulatory departments have jurisdiction over a range of ocean areas, uses, and habitats around the Hawaiian Islands. The HIREP Wind EIS will identify existing ocean cables, jurisdictional boundaries, requirements, cultural practices, existing BMPs and conditions, permitting, and approval procedures needed for the installation and operation of an undersea cable associated with a future wind development project. The full range of government agencies and organizations will be consulted as well as fishermen and cultural practitioner associations, commercial shipping companies, tourism and leisure entities, and the scientific community. Suitable shoreline conditions, including adequate access for the cable landing operations, will be outlined along with oceanographic conditions, nearshore bathymetry, and existing uses in the proposed ocean cable corridors including ship anchorages, recreational uses, commercial boating and environmental considerations, and military restrictions.

Hawai‘i and its coastal areas support a variety of outdoor recreation and tourism opportunities. The HIREP Wind EIS analysis will describe the project setting of cultural, recreation, and tourism opportunities. The intent of these actions is to accurately capture and describe the existing setting, as well as assess potential impacts and outline appropriate mitigation measures associated with undersea cabling and its impact

on recreation and tourism resources. Sources of information will include the Statewide Comprehensive Outdoor Recreation Plan; the DOBOR Designated and Non-Designated *Ocean Recreation Management Areas Provisions;* existing plans and policies at the federal, state, and local level; inventory of cultural and recreation sites and use areas; types and amounts of recreation use; currently known trends; public issues and management concerns; economic impacts of recreation and tourism; and other environmental conditions.

### 3.10.3 Potential Impacts

Issues associated with routing of an undersea cable will be identified, especially those associated with O‘ahu and Maui County, which feature busy commercial and military harbors. Cabling could impact navigation, landside transformer placement, security, port operations, the environment, and cultural practices. The HIREP Wind EIS will analyze the impacts to truck and other vehicle traffic if landside infrastructure affects traffic patterns, either on public roadways or within terminal areas. Both physical (e.g., limited access) and recreation/tourism experience (e.g., benefits, satisfaction, etc.) impacts will be assessed. Since recreation and tourism experiences tend to be inexorably associated with other resource conditions, potential impacts will be coordinated with other appropriate resource areas and associated impact assessments (e.g., terrestrial, aesthetics, marine, land use, cultural/historical, and socioeconomics).

## 3.11 PUBLIC SERVICES, INFRASTRUCTURE, AND UTILITIES

### 3.11.1 Definition of Resource

This section addresses the availability and capacity of public infrastructure and services, including public utilities, waste disposal, police and fire protection, health care, education, and recreational facilities. Transportation and transit are discussed in Sections 3.7 and 3.10 of this HIREP Wind EISPN.

### 3.11.2 Existing Setting and Conditions

#### Energy and Electricity

HECO and its subsidiaries Hawai‘i Electric Light Company (HELCO) and Maui Electric Company, provide electricity for 95 percent of Hawai‘i’s residents. The three associated companies operate a total of 16 petroleum-fueled power plants distributed throughout the main islands of Hawai‘i (except for Kaua‘i, which maintains it own electrical

cooperative). These HECO plants along with independent alternative renewable energy plants have a power-generating capacity of approximately 2,400 MW. Percentage of sales from renewable energy range from HECO's 15 percent to HELCO's 39 percent on the Big Island. Unlike continental electrical systems whose grids can be integrated, in Hawai'i, each island's generating system must stand alone without backup from other utilities. Imported oil costs the state between two and four billion dollars annually. As a result, Hawai'i pays among the most expensive rates in the country. (Hawai'i's efforts at developing sustainable, renewable energy are discussed further in Chapter 1, Section 1.2) of the HIREP Wind EIS. Between 1996 and 2009, conservation, efficiency, and technology programs resulted in reducing electricity demand by 169 MW (equal to a large power plant); avoided burning an average of 1.6 million barrels of oil a year; and reduced emissions of carbon dioxide—a major GHG contributing to climate change—by 864,000 tons a year (HECO 2010b).

**Solid Waste**

Solid waste services are provided by various waste disposal companies on the project islands. Municipal waste is deposited in landfills or, in the case of O'ahu, is also burned at the H-Power facility on the west side of the island. Management of solid waste is regulated by the DOH Office of Solid Waste Management and subject to solid waste rules as codified in Hawai'i Administrative Rules Chapter 11-58.1. Various types of solid waste recycling programs exist at the county level. Honolulu's Department of Environmental Services, Refuse Division manages the collection, disposal, and recycling operations, while that effort is managed by the Solid Waste Division, Recycling Office in Maui County. Hazardous waste is regulated, enforced through the DOH Solid and Hazardous Waste Branch, Hazardous Waste Section, which administers both state regulations and federal regulations pursuant to the EPA. Efforts to manage solid waste from future wind developments will most likely focus on the management of hazardous waste. The anticipated types, impacts, creation and disposal of hazardous waste are discussed in Section 3.15 of this HIREP Wind EISPN.

**Water and Waste Water**

Almost all of the water supply for Hawai'i is secured from groundwater sources with some limited sources provided from rainwater catchment and/or recycling. Public water supply and distribution are provided by the Honolulu Board of Water Supply for O'ahu and the Maui County Department of Water Supply for the islands of Maui and Moloka'i. The Castle and Cooke Company owns and operates the water supply on Lāna'i. Water supplies throughout the state are also provided through private wells that are not

regulated by the state until certain service thresholds are met. DOH and EPA regulate and monitor water supplies and distribution in the state. Each year the various water sources and systems are tested for more than 100 different types of contaminants by DOH. Water agencies have recently stepped up efforts at water conservation through education, metering, graywater recycling, xeriscape landscaping, and closer leak monitoring and repair. At one time, extensive networks of irrigation systems traversed various agricultural areas of the state supplying water primarily for the sugar and pineapple industry. With the demise of these enterprises, the irrigation canals and tunnels have been repurposed or retired.

### Police and Fire Protection Services

Public and private police, security, and fire protection agencies and companies operate throughout the State of Hawai‘i. The City and County of Honolulu and Maui County maintain respective police departments while the Sheriff Division of the Department of Public Safety carries out law enforcement services statewide. It also provides law enforcement services at the Honolulu International Airport. Federal law enforcement and fire protection agencies also operate in the state along with various DoD agencies operating on military bases and in the ocean.

### Health Care Facilities and Emergency Medical Services

The State of Hawai‘i is served by a full range of public and private health care facilities. However, the more rural areas of the state along with less-populated islands, lack the more advanced facilities and trauma response capabilities of the larger urbanized areas. The geographical separation of the state results in a significant amount of medical airlift operations from these less populated areas and islands, and even other islands in the Pacific. O‘ahu supports numerous veterans and military health care facilities to serve the needs of the large military, veteran, and dependent population.

### Education Facilities

Education facilities consist of private and public schools, including the standard range of elementary and higher education facilities operated under the umbrella organizations of the State Department of Education and the University of Hawai‘i system. The flagship University of Hawai‘i campus is located on O‘ahu at Mānoa with satellite campuses in Hilo and west O‘ahu. Seven community colleges are located on the islands of Maui, Hawai‘i, Kaua‘i, and O‘ahu.

### Recreation Facilities

Section 3.10 of this HIREP Wind EISPN contains description and analysis of marine recreation. A mild climate, diverse geography, and a thriving tourism sector have resulted in numerous land-based recreational and cultural opportunities for residents and visitors to the state. Numerous parks, museums, preserves, community centers, and entertainment venues are owned and managed by a range of state and county agencies. There are two national parks in the state: Volcanoes National Park on Hawai‘i and Halē‘akala National Park on the island of Maui. The National Park Service also maintains historic and cultural sites throughout the state, many associated with World War II and Hawaiian culture. The state contains an extensive managed trail system; numerous boat harbors, heiau (Hawaiian temple), and landings for canoes; and beach parks conducive to swimming and surfing. In addition to the range of public facilities, the extensive tourism industry provides access to the full range of cultural, recreational, educational, and historical events and facilities.

## 3.11.3 Potential Impacts

Fire, police, and emergency services are all available in the potential proposed action project areas on the four islands. Implementation of future wind development projects would not be anticipated to impact current service levels. Future projects would also not be expected to affect education, water, wastewater, or health care facilities. The HIREP Wind EIS will discuss possible impacts to recreational facilities, including limitations on formal and informal access and cultural gathering rights. Related to recreation would be an analysis of visual impact to recreational, historical and cultural facilities and areas. Visual resource impacts are discussed in Section 3.9 of this HIREP Wind EISPN. Although not available on all of the proposed project areas, utility resources (e.g., water, solid waste disposal) are available in Maui County and the island of O‘ahu to support temporary needs during the construction components of any future projects. Hazardous materials associated with the operation of heavy equipment and construction vehicles (e.g., oil, diesel, and lubricants) would be properly disposed of at an appropriate facility. The HIREP Wind EIS will outline both beneficial and detrimental anticipated impacts to utilities and public services and proposed appropriate mitigation measures and BMPs.

## 3.12 CULTURAL AND HISTORICAL RESOURCES AND COMPLIANCE WITH ACT 50

### 3.12.1 Definition of Resource

"Resource" is broadly defined as the natural environment or human practices, values, and traditions and their physical manifestations. HRS Chapter 6E (Historic Preservation) establishes a comprehensive program of historic preservation as a means to preserve, restore, and maintain historic and cultural properties, which are more specifically defined as "any building, structure, object, district, area, or site which is more than fifty years old" (HRS Chapter 6E-2).

### 3.12.2 Existing Setting and Conditions

The area of potential effects (APE) under the HIREP Wind EIS will be broadly defined to include potential wind energy generation on the islands of Lānaʻi and Molokaʻi, undersea cable corridors between County of Maui to Oʻahu, and utility infrastructure upgrades on the island of Oʻahu. Maui is also included in the analysis as a producer or recipient of wind generated power. Specific locations considered for the various proposed action components on each of these islands are detailed in Chapter 2.0 of the proposed HIREP Wind EISPN (proposed project areas). However, all the specific features of various components of the actual projects are not fully known (e.g., locations of the wind farms, landing sites, undersea cable routes and substations).

The islands of Molokaʻi and Lānaʻi are nearly entirely rural areas, and the populations of those islands rely significantly on hunting, fishing, and gathering of resources for subsistence. While the potential areas where wind farms may be located are privately owned, they are areas that have historically and continue to be used for subsistence and other traditional and customary activities.

### 3.12.3 Archival Research

There will be an inventory of existing known cultural and historic sites, including cultural impact assessments, archaeological literature reviews, and archaeological inventory surveys conducted to date, as well as any other relevant report or study covering the potential APE. There will be some limited field studies. However, before field studies are initiated, there will be archaeological literature and archival sources to determine if any previously known prehistoric, historic, or cultural resources were documented within the APE.

### 3.12.4 Act 50, Hawai‘i Session Laws 2000

Articles IX and XII of the State Constitution, other state laws, and the courts of the state require government agencies to protect and preserve cultural beliefs, practices, and resources of native Hawaiians and other ethnic groups. To assist decision makers in the protection of cultural resources, Chapter 343, HRS and HAR § 11-200 rules for the environmental impact assessment process require project proponents to assess proposed actions for their potential impacts to cultural properties, practices, and beliefs. This process was clarified by the Hawai‘i State Legislature in Act 50, HSL 2000. Act 50 recognized the importance of protecting native Hawaiian cultural resources and specifically required that EISs include the disclosure of the effects of a proposed action on the cultural practices of the community and state; and in particular the native Hawaiian community. Specifically the Environmental Council suggested the CIAs should include information relating to practices and beliefs of a particular cultural or ethnic groups or groups. Such information may be obtained through public scoping, community meetings, ethnographic interviews, and oral histories.

### 3.12.5 Standards for a CIA in the HIREP Wind EIS

The State and its agencies have an affirmative obligation to preserve and protect the reasonable exercise of customarily and traditionally exercised rights of Hawaiians to the extent feasible (Article XII, Section 7 of the Hawai‘i State Constitution, *Ka Pa‘akai O Ka ‘Āina v. Land Use Commission*, 94 Haw. 31 [2000]{Ka Pa‘akai}, Act 50 HSL 2000).

State law further recognizes that the cultural landscapes on each of the affected islands provide living and valuable cultural resources where native Hawaiians have and continue to exercise traditional and customary practices, including but not limited to hunting, fishing, gathering, and religious practices.

The Hawai‘i Supreme Court, in *Ka Pa‘akai*, provided government agencies an analytical framework to ensure the protection and preservation of traditional and customary native Hawaiian rights while reasonably accommodating competing private development interests. In this HIREP Wind EIS, DBEDT shall making findings to:

1) The identity and scope of valued cultural, historical, or natural resources in the petition area, including the extent to which traditional and customary native Hawaiian rights are exercised in the petition area;

(2) The extent to which those resources – including traditional and customary native Hawaiian rights – will be affected or impaired by the proposed action; and

(3) The feasible action, if any, to be taken is to reasonably protect native Hawaiian rights if they are found to exist.

These areas have not had detailed studies (e.g., pedestrian surveys) conducted on them. Due to the immensity of these areas, and because the specific features of various components of the actual projects are not fully known and will not be proposed as part of this program, the approach to developing the CIA will be as follows:

- Phase 1 – fact gathering
    - Gather historic cultural information mo‘olelo, legends, etc. about the APE to provide cultural foundation for the report;
    - Inventory as much information as can be identified about as many known cultural, historic, and natural resources, including previous archaeological inventory surveys, CIAs, etc. that may have been completed for the possible range of areas;
    - Update the information with small talk story sessions, interviews, etc. to gather current information;
    - Plot the information on a geographic information system (GIS) map to locate the resources in relationship to the area of proposed effect.

- Phase 2 – develop a sensitivity rating for the APEs
    - Develop criteria for high, moderate, and low sensitivity;
    - Plot on the GIS maps the sensitivity ratings for the APEs;
    - Overlay on the GIS maps the wind zones, proposed undersea corridors, and proposed landing sites, etc.

- Phase 3 – develop BMPs
    - Involve the community in developing culturally appropriate mitigation measures (i.e. avoid known burial sites, avoid impacting fishing koa, on-site vs. on-call archaeological monitoring);
    - Develop specific BMPs that will be a condition for future tiered off project-specific tiered environmental reviews

### 3.12.6 Potential Impacts and Mitigation Measures

While all of the potentially altered areas have been dramatically altered since western contact in 1778 in terms of use and vegetation cover, they are largely undeveloped. As such, it can be reasonably expected that there will be significant surface and subsurface archaeological and historic features. These features are likely connected to each other through past and possibly current cultural practices and should be seen not only as discrete archaeological features but as integral parts of larger cultural landscapes.

Given the scale of these projects and the rural nature of the areas they are proposed for, it is anticipated that there will be direct and indirect cultural impacts that will likely be significant. A detailed recording and evaluation will be conducted to comply with the requirements of HAR § 13-276-4 in consultation with DLNR State Historic Preservation Division as well as other NHOs. The Draft HIREP Wind EIS will present the findings and detailed recording and evaluation, and will evaluate the project's impacts to cultural, archaeological, and historic resources. Utilizing the CIA methodology described above, the project will propose BMPs as mitigation measures to avoid the areas of highest sensitivity, minimize or mitigate impacts to areas deemed moderate or low sensitivity, and address cumulative impacts. The Draft HIREP Wind EIS will also require that the more detailed archaeological inventory survey and CIA be prepared for the project-specific tiered EAs/EISs.

## 3.13 SOCIOECONOMICS

### 3.13.1 Definition of Resource

Socioeconomic data describe the population, economic condition, and quality of life within the proposed project areas. Population data include the number of residents in the area and the recent changes in population growth. Data on employment, labor force, unemployment trends, income, and industrial earnings describe the economic health of a region. Income information is provided as an annual total by county and per capita. The number and type of housing units, ownership, and vacancy rate can be indicators of the regional quality of life. The potential geographic areas for the HIREP Wind EIS include the areas determined as the largest contiguous areas of wind zone resource areas by the NREL studies, which are located on the western parts of Molokaʻi and Lānaʻi, on the western and southern shores of Maui and Kahoʻolawe, and on the northern and southern tips of Hawaiʻi. With consultation of various entities and agencies, it was determined that the western and southern shores of Kahoʻolawe and on the northern and southern tips of Hawaiʻi would not be pursued at this time but could

be considered in future environmental reviews. Project-specific proponents for follow-on wind projects would need to do socioeconomic data surveys of the affected specific project locations including Maui County and O‘ahu.

### 3.13.2 Existing Conditions

The existing socioeconomic conditions will be determined by the project-specific proponents for follow-on wind projects that would need to do socioeconomic data surveys of the affected specific project locations including Maui County and O‘ahu.

### 3.13.3 Potential Impacts

Potential direct socioeconomic effects of the proposed facilities would include: (1) construction employment and business activity; (2) state revenues in the form of excise taxes, lease revenues, and property taxes; (3) substantial fuel cost savings to HECO, which potentially translate into ratepayer savings; (4) ongoing employment of facility operation and maintenance staff (which would be relatively limited); and (5) ongoing expenditures for materials and outside services.

The HIREP Wind EIS will enumerate project-related expenditures and employment, as well as the implication that the reduction in HECO fuel cost will have on the cost of electricity to its customers. It will also discuss the extent to which each alternative would directly affect employment and the level of business activity. It is anticipated that the project could potentially disproportionately affect low-income or minority populations and therefore a HIREP Wind EIS is appropriate to fully evaluate and analyze the impacts and identify appropriate mitigation measures.

## 3.14 PUBLIC SAFETY AND HEALTH

### 3.14.1 Definition of Resource

The assessment of safety and health considers activities, occurrences, or operations that have the potential to affect the safety and health of workers or the public, or both. For workers, the Occupational Safety and Health Act (OSHA) regulations (29 CFR Parts 1910 and 1926) set forth safety and health requirements that extend to all U.S. employers and employees. In addition, most states, including Hawai‘i, have state safety regulations associated with various activities, locations, processes, and operations. Activities that expose workers to health-threatening situations, such as handling asbestos, exposure to noise or lead dust, exposure to electromagnetic radiation, and

operating heavy equipment, must comply with various requirements and operational standards. Electromagnetic radiation is defined as energy propagated through free space or through a material medium in the form of electromagnetic waves. Examples include radio waves, infrared radiation, visible light, ultraviolet radiation, X-rays, and gamma rays.

### 3.14.2 Existing Setting and Conditions

Future wind developments will most likely include operation of a DC overhead portion, AC/DC converter station, and a DC underwater cable. Electric and magnetic fields can be generated from various aspects of wind developments. Magnetic field exposure has been the subject of a number of studies, primarily on exposure to AC magnetic fields, because AC fields induce currents into objects unlike DC fields. Because DC fields do not induce currents into objects, exposures are not considered a health risk. The HIREP Wind EIS will consider field exposures of both land-based DC and AC cables associated with future specific wind developments. The HIREP Wind EIS will discuss and analyze transmission of electricity in submarine cables, which may also create electrical and magnetic fields (EMF).

### 3.14.3 Potential Impacts

Members of the public as well as workers could be impacted by activities associated with construction, transportation, maintenance, operation, and decommissioning of future wind developments. Workers' health and safety may be impacted by heavy equipment operation, traffic, heat, dust, and noise. Dust and noise are addressed in more detail in the air quality and noise sections of this HIREP Wind EISPN. Short-term construction-related impacts to safety and health relate to worker safety during construction. Health and safety issues for construction workers relate to the operation of construction equipment; occupational noise; fugitive dust; management of vehicular traffic within the work zone; heavy lifting; slips, trips, and falls while working on uneven terrain; and exposure to heat and biological exposure (bites, stings, and allergens). The HIREP Wind EIS will review the cable developer's findings of the magnitude and characteristics of electric and magnetic fields and review their effects on the environment, based on current state of knowledge and established standards. We will also review the impact these fields have on local communication and operations.

The operation of the overhead portion, and to a lesser extent at the AC/DC converter station, produces an electrical phenomenon known as a "corona." A corona results from the air in the immediate vicinity of the energized conductors being stressed by the high

voltage impressed on them. The effects of the corona can be seen in the production of audible and radio noise and ions (negative and positively charged air molecules).

## 3.15 NATURAL HAZARDS, HAZARDOUS MATERIALS, AND UNEXPLODED ORDNANCE

### 3.15.1 Definition of Resource

#### Natural Hazards

A widely accepted definition characterizes natural hazards as "those elements of the physical environment, harmful to man and caused by forces extraneous to him." More specifically, in this document, the term "natural hazard" refers to all atmospheric, hydrologic, geologic (especially seismic and volcanic), and wildfire phenomena that, because of their location, severity, and frequency, have the potential to affect humans, their structures, or their activities adversely. In Hawai‘i, natural disasters involve to varying degrees, atmospheric (tropical storms, hurricanes), seismic events with associated tsunamis, geologic (rock falls, landslides), hydrologic (coastal flooding, storm surge, drought, erosion and sedimentation), volcanic (gases, lava flows) and wildfires (OAS 1990).

#### Hazardous Materials

A hazardous material is any item or agent (biological, chemical, physical) that has the potential to cause harm to humans, animals, or the environment, either by itself or through interaction with other factors. Hazardous materials are defined and regulated in the United States primarily by laws and regulations administered by the EPA, OSHA, the U.S. Department of Transportation, and the U.S. Nuclear Regulatory Commission (IHMM 2010).

#### Unexploded Ordnance

By definition, explosive ordnance is any munitions, weapon delivery system, or ordnance item that contains explosives, propellants, and chemical agents. Unexploded ordnance (UXO) consists of these same items after they have been: (1) armed or otherwise prepared for action, (2) launched, placed, fired, or released in a way that they cause hazards, and/or (3) remain unexploded either through malfunction or design (Global 2010).

### 3.15.2 Existing Setting and Conditions

#### Floods

The Federal Emergency Management Agency maintains Flood Insurance Rate Maps, which identify varying flood danger zones for the United States including Hawai‘i. Areas are categorized from 100-year base floods with undetermined elevations to areas determined to be outside the 500-year floodplain. Development within a Special Flood Hazard Area must comply with the rules and regulations of the National Flood Insurance Program (44 CFR) and local flood ordinances. Revised Ordinances of Honolulu § 21-9.10 regulates development within flood hazard areas on the island of O‘ahu while Maui County’s flood provisions are codified in Title 19, Chapter 19.62 of the Maui County Code. Hawai‘i’s flood dangers are primarily related to flash flooding of streams and flooding related to storm-generated coastal surges as discussed in the following sections.

#### Tsunamis

Tsunamis are a series of destructive ocean waves generated by seismic activity that could potentially affect all shorelines in Hawai‘i. Tsunamis affecting Hawai‘i are typically generated in the waters off South America, Japan, Alaska, and the west coast of the United States. Local tsunamis have been generated on the island of Hawai‘i in both 1946 and 1960, with devastating impacts to the City of Hilo. After the destructive southeast Asian earthquake and tsunami of 2005, NOAA stepped up efforts at early tsunami warning procedures through the enhancement of the Pacific Ocean wave buoy system. Real-time tsunami monitoring systems are positioned at strategic locations throughout the ocean and play a critical role in tsunami forecasting. Locally, the State of Hawai‘i’s Civil Defense maintains tsunami inundation zone maps and evacuation procedures for all coastal areas in Hawai‘i.

#### Hurricanes and Tropical Storms

The Hawaiian Islands are seasonally affected by Pacific hurricanes from the late summer to early winter months. These storms generally travel toward the islands from a southerly or southeasterly direction and can deposit large amounts of rain with high winds on all the islands. The storms generally exacerbate localized stream flooding and coastal storm surges.

### Earthquakes

In Hawai‘i, 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 Hawai‘i 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. Because O‘ahu is an older Hawaiian Island, it is not considered particularly prone to major seismic activity. O‘ahu is listed in Seismic Zone 2A on a scale of 1 to 4 under the Uniform Building Code of 1997 and the International Building Code of 2003. Zone 2A indicates a place that has a lower potential for ground motion created by seismic activity. The islands of Maui County are located in Zone 2B, which indicates a place that has a slighter greater potential for seismic activity.

### Landslides

Giant landslides over millennia have shaped and formed the Hawaiian Islands. U.S. Geological Survey (USGS) marine scientists have identified over 15 giant landslides surrounding the Hawaiian Islands. The slides are among the largest known on Earth. The youngest is thought to have occurred only one hundred thousand years ago, and there is evidence today that large blocks of land on the island of Hawai‘i are beginning to slide, generating large earthquakes in the process. Each slide has resulted in huge land losses to the islands and resulted in large waves that have carried rocks and sediments as high as 1000 feet ASL. Much smaller landslides pose a more immediate and continual concern in Hawai‘i today. Landslides in Hawai‘i are activated by storms, earthquakes, volcanic eruption, and fires. Related to landslides, debris and mud flows are rivers of rock, earth, and other debris saturated with water. They develop when water rapidly accumulates in the ground during heavy rains. Landslides in Hawai‘i, while frequently the result of natural events, can be the result of land mismanagement particularly in mountain, canyon, and coastal regions and, in a case on the island of Kaua‘i, the failure of a private irrigation dam (USGS 2010).

### Wildfire

Wildfire occurs on all of the major Hawaiian Islands, with human activity as the primary cause. Because Hawai‘i’s native ecosystems are not adaptive to wildlife, they can result in extinction of native species and increased coverage of nonnative, invasive species. Other results of wildfires include soil erosion, increased runoff, and decreased water quality (PDC 2010).

### Volcanoes

The Haleʻakalā volcano on the island of Maui is considered dormant, since it last erupted sometime between 1500 and 1800, but it is not yet considered extinct. The islands of Lānaʻi and Molokaʻi do not have any active volcanoes.

### Hazardous Materials

Prior to the advent of modern regulations and controls starting in the 1970s, oversight of the use and storage of hazardous materials and the management of hazardous waste was minimal or nonexistent. This legacy has resulted in environmental and groundwater contamination in Hawaiʻi from agricultural pesticides, solvents, and polychlorinated biphenyl fluids from industrial machinery, leaking underground storage tanks, industrial waste from plantation activities and paints, heavy metals, and waste bunker fuel on and near military bases. Cleanup efforts are currently underway in various locations in the state and by a wide range of state and federal agencies and stakeholders. The Solid and Hazardous Waste Branch of the DOH regulates the generation, transportation, treatment, storage, and disposal of hazardous wastes. This agency also administers EPA permits, procedures, and regulations for the State. DoD operates various levels of hazardous materials management at its military bases throughout the state.

### Unexploded Ordnance

Since the early 1900s, the state and specifically the island of Oʻahu has been home to military bases for all branches of the U.S. military. One of the negative side effects that these military bases have had on the terrestrial and marine environments is the impact of unexploded ordnance/munitions and explosives of concern (UXO/MEC). UXO/MEC are explosive weapons that did not explode when they were employed and still pose a risk of detonation at their present location either on land or in the ocean.

## 3.15.3 Potential Impacts

### Natural Hazards

Neither construction nor operation of the proposed project is expected to affect the incidence rate of a natural hazard, with the exception of an increased potential for wildfires associated with use of vehicles and electrical equipment in any future project area. In addition to a discussion of how future wind developments may generate hazards, the HIREP Wind EIS will look at how natural hazards may impact future wind

developments and operations. Construction standards will be discussed demonstrating how wind farms, undersea cables and other wind infrastructure would be designed to address, for example, seismic activities, tropical storms, landslides, flooding, and wildfires. Mitigation measures that would be implemented to minimize or avoid impacts relative to natural hazards would also be presented. As with flood zones, any future wind development in tsunami inundation zones will be required to comply with federal and state regulations, which will be outlined in the HIREP Wind EIS.

**Hazardous Materials**

Construction equipment and vehicles contain hazardous materials such as gasoline, diesel, oil, and hydraulic and brake fluids. To minimize the potential for accidental release of these materials into the environment, site-specific BMPs, including procedures for hazardous material storage, handling, and staging; spill prevention and response; waste disposal; and good housekeeping would be developed and implemented by the construction contractor. Any future development would be subject to applicable federal, state, and local regulations governing the transportation, use, storage, and/or disposal of hazardous material and hazardous wastes during construction. The HIREP Wind EIS will provide a detailed evaluation of the potential impacts associated with use of these materials. In addition, the HIREP Wind EIS will outline the measures that would be implemented to mitigate potential impacts that could result from the use of the materials identified above during both construction and subsequent operation of the facility.

Conversely, future wind developments may be proposed in areas of environmental contamination or presently containing either known or unknown hazardous materials. The HIREP Wind EIS will outline the procedures for investigating parcels via the review of public records and the performance of site inspections to identify possible hazardous materials that may be present at wind development locations, including undersea cable alignments. The Phase I Environmental Site Assessment process will be described along with how it will be applied to the investigation of future project sites. The HIREP Wind EIS will provide an explanation of standard mitigation measures and conditions that are applied to development on contaminated sites.

**Unexploded Ordnance**

This HIREP Wind EIS will evaluate the proposed undersea cable alignments for the potential likelihood of encountering UXO/MEC. This analysis will include a review of accessible public records to evaluate the potential likelihood of encountering UXO/MEC

for a particular undersea cable alignment connecting with various landing locations. A primary study to be referenced and discussed in the HIREP Wind EIS will be the University of Hawai'i's School of Ocean and Earth Sciences and Technology (SOEST) Ocean Floor Survey of July 2010. Areas identified in this and other studies outlining corridor alignments will be evaluated for their potential to encounter UXO/MEC. The results will be presented outlining high and low potential areas for encountering UXO/MEC and areas to be avoided.

## 3.16 LAND USE

### 3.16.1 Definition of Resource

This chapter discusses the existing land uses and major landholdings (ownership) in the areas under consideration for the proposed wind program, including applicable upland portions of Lāna'i, Moloka'i, Maui, and O'ahu, as well as the coastal zone (coastal waters and submerged lands).The submerged lands extend from the coastline out into the ocean for three nautical miles (approximately 3.45 statutory miles).

Discussions include the existing and planned land uses by the DoD; federal, state, city, and counties; and policies guiding development in the areas under consideration for potential wind development, such as general plans and community plans.

### 3.16.2 Affected Environment

#### Lāna'i

The island of Lāna'i covers approximately 3,193 acres. Most of the population live in Lāna'i City, centrally located on the island. The settlement pattern was based on the pineapple fields that once dominated the local agricultural activities. Primary land uses on the island include agriculture—most of them categorized as "unique" agricultural lands according to ALISH—and conservation. There are sparse rural and urban use areas, which include Lāna'i City and two luxury resorts in Koele and Manele Bay. Approximately 98 percent of the island is under the ownership of Castle & Cooke, Inc. The area under consideration for wind generation and associated facilities consists of the western part of the island. The primary land use of the region is conservation.

### Molokaʻi

The island of Molokaʻi covers about 165,800 acres. The Kalaupapa peninsula and some of the adjacent lands on the northern coast are excluded from the Maui County and, instead, comprise the DOH-administered County of Kalawao. Kaunakakai is the islandʻs major population and commercial center. There is also a settlement pattern along the southeast coast, which becomes more rural and scattered as it extends from Kaunakakai to Halawa Valley. The dominant land use on Molokaʻi is agriculture, followed by conservation uses. According to ALISH classification, there are pockets of prime agricultural lands on the west half of Molokaʻi. There are select rural and urban uses on the island as well. Major landowners on Molokaʻi include the State of Hawaiʻi, including the Department of Hawaiian Home Lands (DHHL) [48,941 acres], Molokaʻi Ranch (44,926 acres), Kamehameha Schools (4,936 acres), Castle & Cooke (2,745 acres), and Maui County (245 acres). The area under consideration for wind generation and associated facilities is found along the northern half of the island between Maunaloa and Kualapuʻu, and along the southern half of the island east of Kaunakakai. The land uses found in the area under consideration are mostly agriculture; other uses include conservation and rural. The wind resource areas traverse many of the land uses.

### Maui

Notable communities on the stateʻs second largest island include West Maui, Wailuku-Kahului, Paʻia-Haʻiku, Makawao-Pukalani-Kula, Kihei-Makena, and Hana. Much of the island is under conservation use and significant portions of the agricultural lands along the western end of Maui and the area included in the Wailuku, Haʻiku, and Pukalani regions are classified as prime ALISH properties. Areas of settlement are found along the coast, with exceptions to a significant segment along the southern part of the island, and areas under conservation use—West Maui Mountains and the large extent of Mount Haleakalā. Maui is also a major tourist destination, and accommodations can be found throughout the island. Major landowners on Maui include the of Hawaiʻi (including DHHL [128,976 acres], Alexander & Baldwin (93,602 acres), Haleakala Ranch (30,526 acres), the U.S. government (29,290 acres), Maui Land & Pineapple Company, Inc. (26,613 acres), Ulupalakua Ranch (17,940 acres), C. Brewer (13,167 acres), the County of Maui (7,240 acres), James Campbell Estates (4,293 acres), and the Kamehameha Schools (2,561 acres). Areas under consideration for wind generation and associated facilities include Class 7 (“superb”) wind resources found along south of the West Maui Mountains. Much of the area northwest of the isthmus is wind-rich, as well as the southern segment and parts of the area southeast of the isthmus. Common

land uses found in the areas under consideration are agriculture and conservation, although pockets of urban and rural uses are found. The wind resource area traverses many of the landholdings mentioned above. There is an existing wind farm on the West Maui Mountains operated by First Wind; and there is a planned wind farm at the Ulupalakua Ranch by Auwahi Wind Energy.

**Oʻahu**

Oʻahu is the third largest island in the state and the most populous, with about 75 percent of the stateʻs population residing in its urban, suburban, agricultural, and rural areas. Major landowners include the State of Hawaiʻi (including DHHL [75,340 acres]), the U.S. government (59,134 acres), Kamehameha Schools (50,026 acres), Castle & Cooke (34,095 acres), James Campbell Estates (23.913 acres), and the City and County of Honolulu (18,795 acres). Areas under consideration for landing sites include coastal areas in the vicinity of the Pearl Harbor and Kāneʻohe Bay, and/or coastal areas in between.

### 3.16.3 Potential Impacts

Compatibility with the existing and planned uses with the proposed wind program components cannot be determined until project-specific proposed wind development projects are made. In addition to the State of Hawaiʻi Land Use Ordinance (HAR 205), the following planning documents will need to be adhered to, to ensure adverse impacts to existing uses are minimized or avoided:

Lānaʻi: *County of Maui 2030 General Plan Countywide Policy Plan*; *Lānaʻi Community Plan* (1998)

Molokaʻi: *County of Maui 2030 General Plan Countywide Policy Plan*; *Molokaʻi Community Plan* (2001)

Maui: *County of Maui 2030 General Plan Countywide Policy Plan*; *Draft Maui Island Plan* (2009); *West Maui Community Plan* (1996); *Wailuku-Kahului Community Plan* (2002); *Paʻia-Haʻiku Community Plan* (1995); *Makawao-Pukalani-Kula Community Plan* (1996); and *Kihei-Makena Community Plan* (1998).

Oʻahu: *Oʻahu General Plan; Koʻolaupoko Sustainable Community Plan* (2000); *Primary Urban Center Development Plan* (2004); *Central Oʻahu Sustainable Communities Plan* (2002).

## 3.17 CLIMATE AND CLIMATE CHANGE

### 3.17.1 Definition of Resource

Climate refers to the average weather conditions in a region over a long period of time. The climate of a location is affected by its latitude and terrain, as well as by the nearby ocean and its currents. Specific climate types can be described based on characteristics such as temperature and rainfall.

Climate change is a long-term change in the statistical distribution of weather patterns over periods of time that range from decades to millions of years. It may be a change in the average weather conditions or a change in the distribution of weather events with respect to an average, for example, greater or fewer extreme weather events. Climate change may be limited to a specific region, or may occur across the whole Earth. In recent usage, especially in the context of environmental policy, climate change usually refers to changes in modern climate. It may be qualified as anthropogenic climate change, more generally known as global warming or anthropogenic global warming (AGW). The most general definition of climate change is a change in the statistical properties of the climate system when considered over periods of decades or longer, regardless of cause. Accordingly, fluctuations on periods shorter than a few decades, such as El Niño, do not represent climate change.

### 3.17.2 Existing Setting and Conditions

#### Climate

Hawai‘i’s climate is characterized by two seasons: summer (May through September) and winter (October through April). In general, the islands have relatively mild temperatures and moderate humidity throughout the year (except at high elevations), with persistent northeasterly trade winds and infrequent severe storms. However, summer is typically warmer and drier, with minimal storm events. The trade winds are prevalent 80 to 95 percent of the time during the summer months, when high-pressure systems tend to be located north and east of Hawai‘i. During the winter months, the high-pressure systems are located farther to the south, decreasing the prevalence of the trade winds to about 50 to 80 percent of the time. Despite the strong marine influence resulting from Hawai‘i’s insularity, some mountainous areas exhibit semi-continental conditions. Combined with the rugged and irregular topography, the result is diverse climatic conditions across the various regions of the state, including significant

geographic differences in rainfall amounts, which range from 20 inches to 300 inches annually (WRCC 2010).

### Climate Change

Island communities are especially vulnerable to a warming and more energetic climate system. Climate vulnerabilities exist at three tiers: exposure, sensitivity, and adaptive capacity. The former, exposure, is determined by climate forecasting based on sound science while the latter two are determined by the strength of the existing policy and planning infrastructure. As the only U.S. state located in the tropics, and the only one surrounded entirely by water, scientists expect climate change to affect the Hawaiian Islands in ways unlike anywhere else in the country. Some key vulnerabilities for Hawai‘i due to climate change include availability of freshwater, exposure to coastal hazards including sea level inundation, and negative impacts of climate change to coastal and marine ecosystems (UH 2010).

## 3.17.3 Potential Impacts

The proposed project is not expected to affect natural climatic conditions or weather patterns. However, the HIREP Wind EIS will include a more thorough evaluation of potential impacts to climatic conditions or weather patterns associated with climate change. Future wind development projects could be expected to have a beneficial impact on climate change by decreasing fossil fuel consumption. The burning of fossil fuels results in the emission of several GHGs, mainly carbon dioxide, methane, and nitrous oxide, all of which contribute to climate change. Renewable electricity generated by wind developments does not create GHGs. Replacing fossil fuel use with wind energy would result in the reduction of GHGs being emitted into the atmosphere and would be associated with a concurrent reduction in climate change impacts.

# CHAPTER 4.0
# FINDINGS AND DETERMINATION

The following sections summarize the significance criteria used to determine whether the proposed action would have a significant effect on the environment (Section 4.1) and the resulting determination.

## 4.1 SIGNIFICANCE CRITERIA

In accordance with HAR § 11-200-12, the proposing agencies have considered every phase of the proposed action, the expected consequences, both primary (direct) and secondary (indirect), and the cumulative as well as the short-term and long-term effects of the action, in order to determine whether the proposed action may have a significant effect on the environment. In making this determination, the proposed action has been evaluated with respect to the significance criteria established in HAR § 11-200-12. Pursuant to HAR § 11-200-12, the determination of whether an action would have a significant impact on the environment should be based on an evaluation of the expected consequences of the proposed action, including the cumulative and overall effects, using the significance criteria. Each of these significance criteria is presented below and is discussed in the context of the proposed project.

HAR § 11-200-12 Subparagraph B states that "in most instances, an action shall be determined to have a significant effect on the environment if it":

- Involves an irrevocable commitment to loss or destruction of any natural or cultural resource;
- Curtails the range of beneficial uses of the environment;
- Conflicts with the state's long-term environmental policies or goals and guidelines as expressed in Chapter 344, HRS, and any revision thereof and amendments thereto, court decisions, or executive orders;
- Substantially affects the economic and social welfare of the community or state;
- Substantially affects public health;
- Involves substantial secondary impacts such as population changes or effects on public facilities;

- Involves a substantial degradation of environmental quality;
- Is individually limited but cumulatively has considerable effect upon the environment or involves a commitment for larger actions;
- Substantially affects a rare, threatened, or endangered species, or its habitat;
- Detrimentally affects air or water quality or ambient noise levels;
- Affects or is likely to suffer damage by being located in an environmentally sensitive area such as a flood plain, tsunami zone, beach, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal waters;
- Substantially affects scenic vistas and viewplanes identified in county or state plans or studies; or
- Requires substantial energy consumption.

## 4.2 ANTICIPATED DETERMINATION

Based on the established significance criteria and the description of the proposed project, as presented in Chapter 3 of this HIREP Wind EISPN, it is anticipated that the proposed action may result in a significant impact to the human and/or natural environment. It has also been determined that the creation of this program facilitating follow-on project-specific proposed wind projects may result in significant impact to the human and/or natural environment. Therefore, in accordance with NEPA and HRS Chapters 201N and 343, and HAR § 11-200, the Applicant intends to prepare an EIS to ensure that any follow-on project-specific proposed wind projects follow the guidelines specified in the Final Programmatic EIS so that consistent analyses on project-specific proposed wind projects can be conducted in the future.

# CHAPTER 5.0
# PUBLIC PARTICIPATION AND INPUT

## 5.1 PUBLIC PARTICIPATION

It is anticipated that the State scoping process will commence with the publication of the HIREP Wind EISPN in OEQC's *The Environmental Notice* and the federal scoping process will begin with the publication of the DOE NOI in the *Federal Register*. Tentative dates for the publication in *The Environmental Notice* and the *Federal Register* are December 8, 2010, and December 10, 2010, respectively. Joint agency public scoping meetings in Hawai'i are anticipated to occur in late January 2011 through early February 2011. Notice of the public scoping meetings will be published in local newspapers and on a project website at www.hirep-wind.com.

Public comments are encouraged. Any comments received during the public scoping period will be documented in the Draft HIREP Wind EIS and taken into consideration during the scope of analysis of the Draft HIREP Wind EIS.

Public hearings will also be held after the submittal of the Draft HIREP Wind EIS to solicit comments on the Draft HIREP Wind EIS. Comments received during the public comment period on the Draft HIREP Wind EIS will be documented in the Final HIREP Wind EIS and taken into consideration during the analysis of the Final HIREP Wind EIS.

## 5.2 PRELIMINARY COMMUNITY OUTREACH

Retained as part of the consultant team, Ku'iwalu has conducted extensive small group "talk story" meetings in nontraditional forums, including extensive outreach to the native Hawaiian community, organizations and individuals. Specific feedback has been incorporated into this HIREP Wind EISPN. Specifically, prior to the issuance of this HIREP Wind EISPN, Ku'iwalu has conducted over 60 one-on-one or small group talk story sessions to gain a broad overview of the cultural resources in the area of potential effect and concerns about what potential significant impacts might be if the program is implemented. The community outreach sessions included talk story sessions with key community stakeholders in the affected communities, including Lāna'i and Moloka'i, legislators, cultural practitioners, NHOs, and environmental interests to encourage and engage in early communication and coordination with the affected communities and interested public groups.

## 5.3 FUTURE CULTURAL IMPACT ASSESSMENT ACTIVITIES

As discussed in Section 1.5.2, the State recognizes that the cultural landscapes on each of the affected islands provide living and valuable cultural resources where native Hawaiians exercise traditional and customary practices, including but not limited to hunting, fishing, gathering, and religious access. With this recognition comes the obligation to preserve and protect those constitutionally guaranteed rights. Accordingly, pursuant to HRS 343, Act 50, a CIA will be prepared by Ku‘iwalu as part of the State environmental review process. The CIA will: (1) identify the valued cultural, historical, and natural resources, including traditional and customary practices exercised within the affected areas, (2) identify the potential threats or impacts to these valued resources by proposed wind program, and (3) establish “feasible actions” or BMPs to be implemented or undertaken when the project-specific tiered EAs/EISs are prepared for the specific wind project. This CIA goes beyond the scope of the required NHPA Section 106 consultation and compliance customarily conducted with the NEPA compliance activities under DOE programs. All of these elements will be part of the evaluation of the proposed wind energy program.

# CHAPTER 6.0
# DISTRIBUTION LIST

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# CHAPTER 7.0
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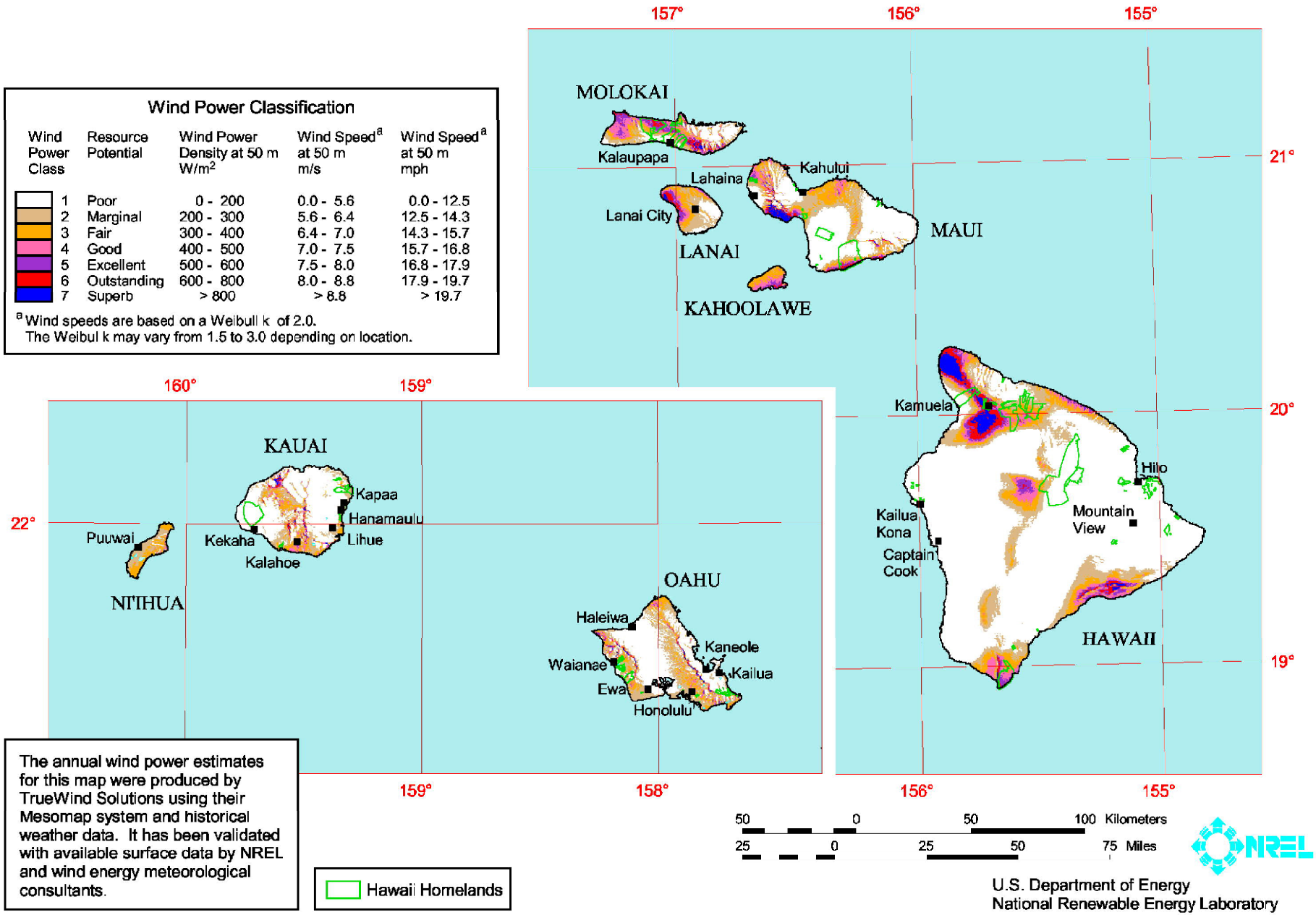
# FIGURES

# Hawaii - 50 m Wind Power




## Hawai'i Interisland Renewable Energy Program EISPN

## Figure 1: National Renewable Energy Lab Wind Power - Hawai'i

11/22/2010 AECOM

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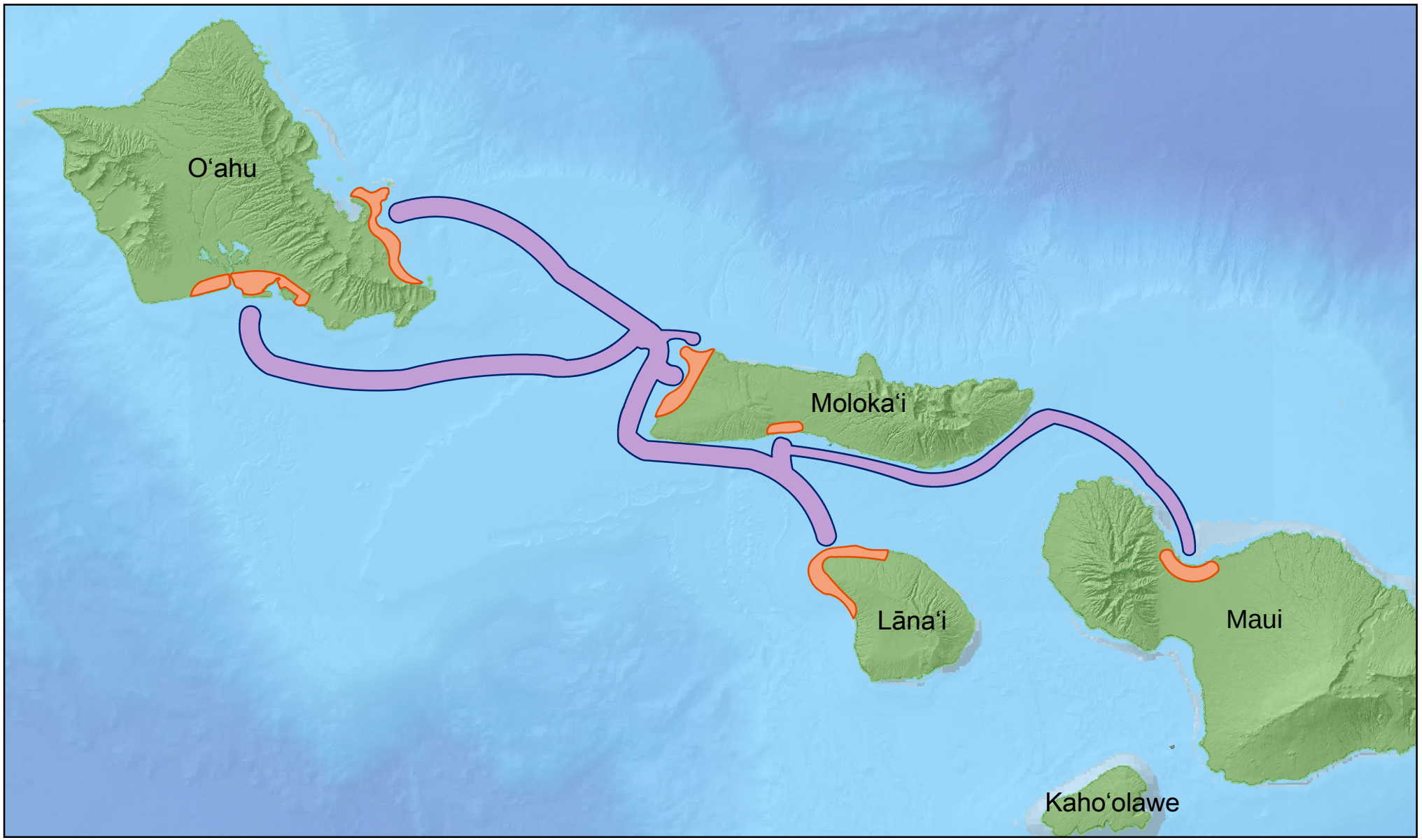
Source: HI-DBEDT, UH-SOEST, NREL, AECOM, 2010




# Hawai‘i Interisland Renewable Energy Program EISPN
## Figure 2: General Cable Route & Landing Site Analysis Areas

N

General Cable Route Analysis Areas
General Cable Landing Site Analysis Areas
Islands

**Ocean Depth Color Ramp (Feet below Sea Level)**

High : 0

Low : -6000

0 5 10 15

Miles

11/22/2010

AECOM

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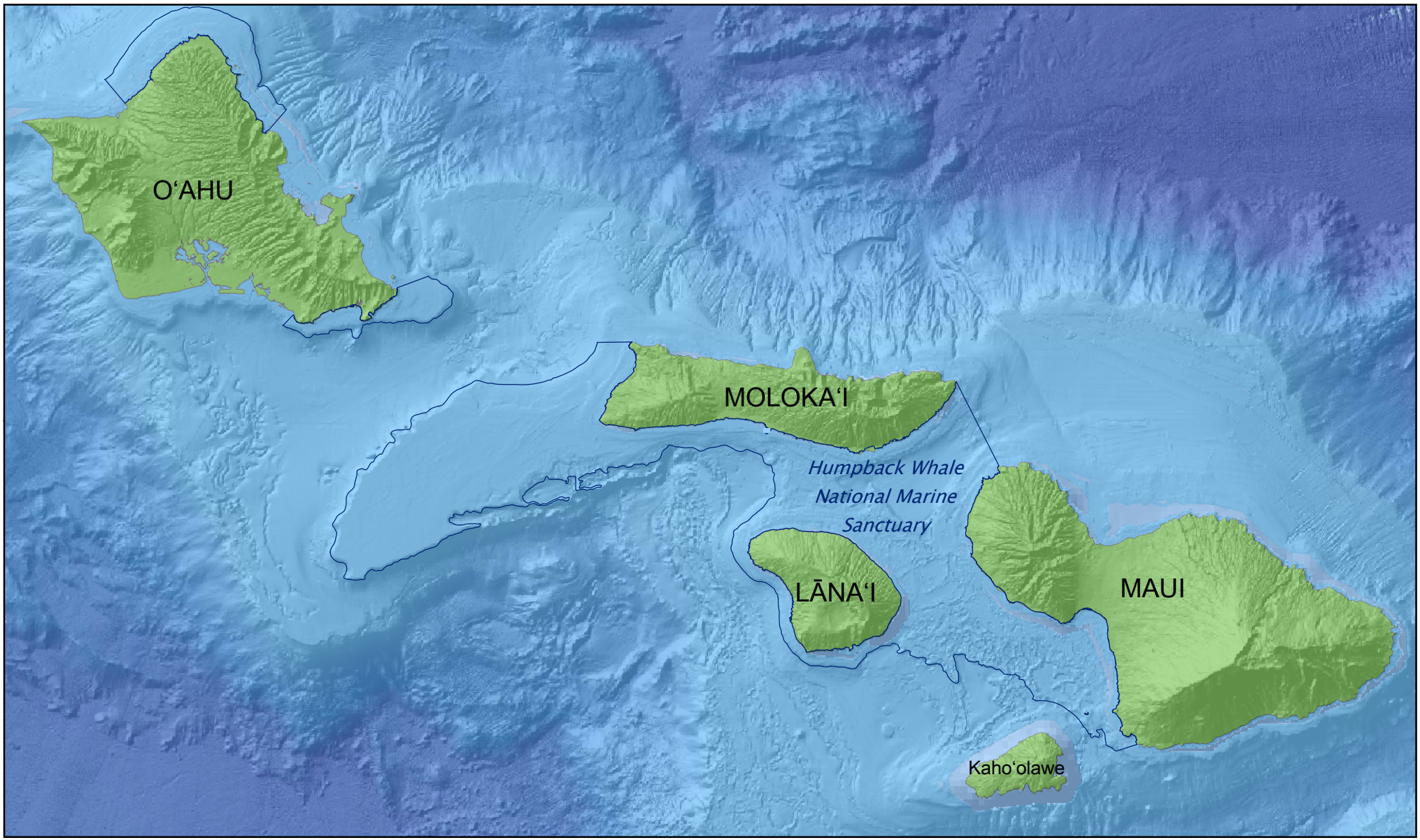


# Hawai‘i Interisland Renewable Energy Program EISPN
## Figure 3: Humpback Whale National Marine Sanctuary

Humpback Whale National Marine Sanctuary

Central Hawai‘ian Islands

**Ocean Depth (Ft)**

High : 0

Low : -6000

N

0 5 10 15

Miles

11/22/2010

AECOM

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